DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R6–ES–2014–0033; 4500030113]

Endangered and Threatened Wildlife and Plants; 12-Month Finding on the Petition To List Least Chub as an Endangered or Threatened Species

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a revised 12-month finding on a petition to list the least chub (*Iotichthys phlegethontis*) as an endangered or threatened species and to designate critical habitat under the Endangered Species Act of 1973, as amended (Act). After a review of the best available scientific and commercial information, we find that listing the least chub is not warranted at this time. Therefore, we are removing the species from our list of candidates under the Act. However, we ask the public to submit to us any new information that becomes available concerning threats to the least chub or its habitat at any time.

DATES: The finding announced in this document was made on August 26, 2014.

ADDRESSES: This finding is available on the Internet at *http://www.regulations.gov* at Docket No. FWS–R6–ES–2014–0033. Supporting documentation we used in preparing this finding is available for public inspection, by appointment, during normal business hours at: U.S. Fish and Wildlife Service, Utah Ecological Services Field Office, 2369 West Orton Circle, Suite 50, West Valley City, UT 84119; telephone 801–975–3330. Please submit any new information, materials, comments, or questions concerning this finding to the above street address.

FOR FURTHER INFORMATION CONTACT: Larry Crist, Field Supervisor, Utah Ecological Services Field Office (see **ADDRESSES** section). If you use a telecommunications device for the deaf (TDD), call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Background

Section 4(b)(3)(B) of the Act (16 U.S.C. 1531 et seq.) requires that, for any petition to revise the Federal Lists of Threatened and Endangered Wildlife and Plants that contains substantial scientific or commercial information indicating that listing the species may be warranted, we make a finding within 12 months of the date of receipt of the petition. In this finding, we determine that the petitioned action is: (a) Not warranted, (b) warranted, or (c) warranted, but immediate proposal of a regulation implementing the petitioned action is precluded by other pending proposals to determine whether species are endangered or threatened, and expeditious progress is being made to add or remove qualified species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Section 4(b)(3)(C) of the Act requires that we treat a petition for which the requested action is found to be warranted but precluded as though resubmitted on the date of such finding, that is, requiring a subsequent finding to be made within 12 months. We must publish these 12-month findings in the **Federal Register**.

Previous Federal Actions

On December 30, 1982, the Service classified the least chub as a Category 2 candidate species (47 FR 58454). Category 2 included taxa for which information in the Service's possession indicated that a proposed listing rule was possibly appropriate, but for which sufficient data on biological vulnerability and threats were not available to support a proposed rule. On January 6, 1989, we reclassified the least chub as a Category 1 candidate species (54 FR 554). Category 1 included taxa for which the Service had substantial information in our possession on biological vulnerability and threats to support preparation of listing proposals. The Service ceased using category designations in February 1996. On September 29, 1995, we published a proposed rule to list the least chub as endangered with critical habitat (60 FR 50518). A listing moratorium, imposed by Congress in 1995, suspended all listing activities and further action on the proposal was postponed.

In 1998, during the moratorium, the Service, Utah Division of Wildlife Resources (UDWR), Bureau of Land Management (BLM), Bureau of Reclamation, Utah Reclamation Mitigation and Conservation Commission (Mitigation Commission), Confederated Tribes of the Goshute Reservation, and Central Utah Water Conservancy District developed a least chub candidate conservation agreement (CCA), and formed the Least Chub Conservation Team (LCCT) (Perkins *et al.* 1998, entire). The goals of the CCA are to ensure the species' long-term survival within its historical range and to assist in the development of rangewide conservation efforts. The objectives of the CCA are to eliminate or significantly reduce threats to the least chub and its habitat, to the greatest extent possible, and to ensure the continued existence of the species by restoring and maintaining a minimum number of least chub populations throughout its historical range. The LCCT implements the CCA and monitors populations, threats, and habitat conditions. These agencies updated and revised the 1998 CCA in 2005 (Bailey *et al.* 2005, entire) and amended the 2005 CCA in 2014 (LCCT 2014, entire; see Previous and Ongoing Conservation Efforts and Future Conservation Efforts, below). Implementation of the CCA resulted in the discovery of two additional wild populations, acquisition and protection of occupied habitat, fencing of sensitive habitat to limit grazing, removal of grazing at select sites, an agreement with the mosquito abatement districts to limit the introduction and use of western mosquitofish (*Gambusia affinis*), introductions of least chub into unoccupied suitable habitat, development of memoranda of understanding (MOUs) with grazing operators on private lands, restoration of occupied habitat, and groundwater monitoring near natural populations.

On June 25, 2007, we received a petition from Center for Biological Diversity, Confederated Tribes of the Goshute Reservation, Great Basin Chapter of Trout Unlimited, and Utah Chapter of the Sierra Club requesting that we list the least chub as threatened under the Act and designate critical habitat for it. Our 90-day finding (73 FR 61007, October 15, 2008) concluded the petition presented substantial information indicating that listing may be warranted. Our subsequent 12-month finding identified least chub as a species for which listing as endangered or threatened was warranted but was precluded due to higher priority listing decisions, and we assigned the least chub a listing priority number of 7 (75 FR 35398, June 22, 2010). Following the finding, we completed annual candidate notices of review (CNORs) in 2010 (75 FR 69222, November 10, 2010), 2011 (76 FR 66370, October 26, 2011), 2012 (77 FR 69994, November 21, 2012) and 2013 (78 FR 70104, November 22, 2013), all of which maintained the species as a candidate with a listing priority number of 7. As a result of the Service's 2011 multidistrict litigation settlement with petitioners, a proposed listing rule or a withdrawal of the 12-month finding is required by September 30, 2014 (In re:

Endangered Species Act Section 4 Deadline Litigation, No. 10–377 (EGS), MDL Docket No. 2165 (D.D.C. May 10, 2011)).

Species Information

The least chub is an endemic minnow (Family Cyprinidae) of the Bonneville Basin in Utah. Historically, least chub were widely distributed throughout the basin in a variety of habitat types, including rivers, streams, springs, ponds, marshes, and swamps (Sigler and Miller 1963, p. 91). As implied by its common name, the least chub is a small fish, less than 55 millimeters (2.1 inches) long. It is an opportunistic feeder, and its diet reflects the availability and abundance of food items in different seasons and habitat types (Sigler and Sigler 1987, p. 182; Crist and Holden 1980, p. 808; Lamarra 1981, p. 5; Workman *et al.* 1979, p. 23). Least chub in natural systems live two times longer than originally thought; some least chub may live to be 6 years of age (Mills *et al.* 2004a, p. 409). Differences in growth rates may result from a variety of interacting processes, including food availability, genetically based traits, population density, and water temperatures (Mills *et al.* 2004a, p. 411).

Maintaining hydrologic connections between springheads and marsh areas is important in fulfilling the least chub's ecological requirements (Crawford 1979, p. 63; Crist and Holden 1980, p. 804; Lamarra 1981, p. 10). Least chub follow thermal patterns for habitat use. In April and May, they use the flooded, warmer, vegetated marsh areas (Crawford 1979, pp. 59, 74), but in late summer and fall they retreat to spring heads as the water recedes, to overwinter (Crawford 1979, p. 58). In the spring, the timing of spawning is a function of temperature and photoperiod (Crawford 1979, p. 39). Thermal preferences demonstrate the importance of warm rearing habitats in producing strong year classes and viable populations (Billman *et al.* 2006, p. 434).

Our 1995 proposed rule (60 FR 50518, September 29, 1995), 2010 12-month finding (75 FR 35398, June 22, 2010), and CNORs for the least chub (75 FR 69222, November 10, 2010; 76 FR 66370, October 26, 2011; 77 FR 69994, November 21, 2012; 78 FR 70104, November 22, 2013) include a more detailed description of the species' life history, taxonomic classification, and historical distribution.

Population Distribution

The current distribution of the least chub is highly reduced from its historical range in Utah's Bonneville Basin, based on UDWR survey and monitoring data collected since 1993. A comparison of survey results from the 1970s (Workman *et al.* 1979, pp. 156–158) to surveys from 1993 to 2007 (Hines *et al.* 2008, pp. 36–45) indicates that approximately 60 percent of the natural populations extant in 1979 were extirpated by 2007 (75 FR 35398).

Least chub are distributed across three Genetic Management Units (GMU)—West Desert GMU, Sevier GMU, and Wasatch Front GMU. The GMUs were delineated by the LCCT based on genetics information that showed population similarities in these areas (Mock and Miller 2005, pp. 271–277). Six naturally occurring populations of least chub remain within these GMUs: The Leland Harris Spring Complex, Gandy Marsh, Bishop Springs Complex, Mills Valley, Clear Lake, and Mona Springs (Hines *et al.* 2008, pp. 34–45).

The West Desert GMU is represented by three of these populations (the Leland Harris Spring Complex, Gandy Marsh, and Bishop Spring Complex) (Perkins *et al.* p. 22, 28–29), which occur in the Snake Valley of Utah's west desert and are genetically similar and very close in proximity to each other (Mock and Miller 2005, p. 276; Mock and Bjerregaard 2007, pp. 145–146). The Sevier GMU is represented by the genetically similar Mills Valley and Clear Lake populations, which are located in relatively undeveloped sites in the Sevier subbasin on the southeastern border of the species' native range (Mock and Miller 2003, pp. 17–18; Mock and Miller 2005, p. 276; Mock and Bjerregaard 2007, pp. 145–146; Hines *et al.* 2008, p. 17). The Wasatch Front GMU is represented by the Mona Springs site (Perkins et al. 1998, pp. 22, 29–31). This GMU occurs in the southeastern portion of the Great Salt Lake subbasin on the eastern border of ancient Lake Bonneville, near the highly urbanized Wasatch Front (Mock and Miller 2005, p. 276). Least chub are still found in small numbers at the Mona Springs site (Hines *et al.* 2008, p. 37) which is genetically distinct from the other populations (Mock and Miller 2005, p. 276; Mock and Bjerregaard 2007, pp. 145–146). The small number of least chub at Mona Springs does not compose a viable self-sustaining population (LCCT 2008a, p. 3), but remains extant due to stocking activities. A detailed description of the naturally occurring least chub populations can be found in the 2010 12-month finding (75 FR 35398) and 2014 CCA amendment (LCCT 2014, pp. 7–14).

In addition to actively managing and conserving the remaining wild populations, establishment of additional least chub populations has been a goal of the LCCT since it was established in 1998 (Perkins *et al.* 1998, entire). With the purpose of providing redundancy and resiliency to the naturally occurring least chub populations, introduced populations provide secure genetic refuges to protect against catastrophic loss, mitigate current and future threats that may affect natural populations, and provide a source for reestablishing naturally occurring populations or establishing new populations. Since 1979, the UDWR attempted approximately 30 introductions of least chub to new locations within its historical range. Nineteen of these attempts through 2008 were described in detail in the 2010 12-month finding. However, these early introductions (pre-2008) were not highly successful or lacked sufficient monitoring to determine success; therefore, in our 2010 12-month finding (75 FR 35398), we did not consider them to be contributing to the conservation of the species, and as a result we did not evaluate whether they faced threats in our 5-factor analysis.

Since our 2010 12-month finding (75 FR 35398), we have additional monitoring data for the pre-2008 introduced populations. We have also developed success criteria for least chub habitat requirements (for specific criteria needed for success, see below). The success criteria allow us to evaluate the ability for each introduced population to contribute to species conservation. The success criteria also guides site selection for new introductions, and was used to establish four least chub introduction sites since 2008. Overall, introduced sites that are occupied by least chub and meet the success criteria are considered to contribute to conservation, and we evaluate the threats at those sites in this finding; there are 10 least chub introduced sites that are considered successful, as explained below. When experimental introductions fail, they typically fail in the first or second year after introduction due to existing threats at the site, including a lack of water quantity and quality, presence of nonnative fishes, or lack of adequate habitat conditions (UDWR 2013b, entire).

Success criteria for introduced least chub sites were established by the LCCT: (1) A documented stable and secure water source (preferably with a water right); (2) water quality suitable for least chub (appropriate pH, salinity, and dissolved oxygen levels); (3) no nonnative fishes present, or if any are present they are species or numbers which are determined not to be a threat to least chub persistence (e.g., low numbers of carp, rainbow trout, goldfish); (4) no grazing, or grazing for an agreed upon extent and duration which does not appear to have negative impacts on least chub or their habitat; (5) habitat requirements that are suitable for long-term persistence of least chub (e.g., adequate cover, over winter habitat, size); and (6) the introduction must occur on land where the owner or agency is signatory to a conservation agreement, or on land where an appropriate similar agreement is in place (LCCT 2013a, pp. 2, 3). Assessments are conducted prior to least chub introductions to ensure a low level of existing threats (LCCT 2013a, p. 2). In addition, the site must maintain at least two seasons of documented recruitment and no significant threats (LCCT 2013a, p. 3).

Our goal for introduced populations, as agreed to and finalized by the LCCT, requires the successful establishment of three introduced populations in each of the three GMUs, with the introduced populations providing a genetic representation of each of the six wild populations (LCCT 2013a, p. 1). This goal has been met or exceeded for all but one of the naturally occurring populations (Table 1; LCCT 2013a, p. 4; LCCT 2013b, p. 6). The Clear Lake population in the Sevier GMU does not have a representative introduced population (LCCT 2013b, p. 6). In 2013, a fire and debris flow impacted the population at Willow Springs, which was the only introduced site replicating the Clear Lake population. The UDWR and BLM personnel salvaged as many fish as possible, and relocated them to the Fisheries Experiment Station (FES) hatchery facility. The UDWR is working to reestablish an introduction site for the Clear Lake population. Additional fish will be transported from Clear Lake to FES in 2014, to increase the founding number of individuals for this temporary hatchery population. This population will be held at FES until a suitable introduction site can be established. The Clear Lake population was also introduced into Teal Springs in 2013 (UDWR 2013b, p. 21). This introduction is considered an experimental population, as it is too recent to meet all the introduction criteria.

TABLE 1—SUCCESSFUL INTRODUCED LEAST CHUB SITES BY SOURCE GMU AND POPULATION

Name	Source GMU	Source pop.	Year	Number years documented recruitment	Ownership	Water right	Non-native species	Grazing status
Fitzgerald WMA	Sevier	Mills	2006	8	UDWR	Yes	Carp, goldfish in low densities.	Not grazed.
Rosebud Top Pond.	Sevier	Mills	2008	6	Private	Yes	Sterile rainbow trout in low densities.	Not grazed.
Cluster Springs	Sevier	Mills	2008	6	BLM	Yes	None	Yes, but fenced and managed.
Pilot Spring SE	Sevier	Mills	2008	6	BLM	Yes	None	Yes, but managed.
Escalante Elementary.	Wasatch Front	Mona	2006	8	Local Gov't	Yes	None	Not grazed.
Upper Garden Creek.	Wasatch Front	Mona	2011	3	Utah State Parks	Yes	None	Not grazed.
Deseret Depot	Wasatch Front	Mona	2011	3	Dept. of Defense	Yes	None	Not grazed.
Red Knolls Pond	West Desert	Bishop	2005	9	BLM	Yes	None	Not grazed.
Keg Spring	West Desert	Gandy	2009	5	BLM	Yes	None	Yes, but fenced and managed.
Pilot Spring	West Desert	Leland	2008	6	BLM	Yes	None	Yes, but fenced and managed.

In summary, there are 5 naturally occurring (excluding Mona Springs due to a lack of a self-sustaining population) and 10 successful introduced populations of least chub distributed across three GMUs that we conclude can contribute to the conservation of the species (see Table 1). As such, we evaluate the status and threats to these populations throughout the remainder of this document.

Population Size and Dynamics

The UDWR began surveying least chub in the 1970s, but monitoring was limited to known populations in the Snake Valley region (Workman *et al.* 1979, p. 1). Sites were inconsistently monitored for least chub abundance through the 1980s (Osmundson 1985, p. 4), but by 1993, known least chub sites were monitored annually (Wilson *et al.* 1999, p. 3) using standardized survey methods (Crist 1990, p. 10). Through the 1998 CCA, the signatories committed to continue annual sampling of known least chub populations (including introduced populations), to gather information on least chub life history and habitat needs, and report these findings annually (Perkins *et al.* 1998, p. 4). In 2007 (and updated in 2010), the sampling methodology changed to include cursory sampling at each site annually, and an in-depth distribution sampling at each site every third year on a rotating annual basis (UDWR 2007, entire; UDWR 2010a, entire; UDWR 2013a, pp. III–2). The annual cursory sampling provides a representative sample (100 individuals) of least chub, which are individually measured to provide the percentage of juveniles to adults; the greater number of juveniles indicates higher recruitment and reproductive success (UDWR 2013a, p. III–2). The distributional surveys monitor designated sites throughout the complex, calculating percentage of sites occupied and catch-per-unit-effort (CPUE) values for the population (UDWR 2013a, pp. I–3, III–2). The introduced sites are sampled annually following the cursory approach, documenting age class structure (i.e., recruitment) at each site (UDWR 2013a, p. I–2).

The sampling in 2010 documented recruitment at natural and introduced sites, but CPUE values exhibited high variability across years due to factors unrelated to population size (Hogrefe 2001, p. 4; UDWR 2013a, entire). This variability is likely due to several factors: In-depth distributional surveys are only conducted every 3 years per population (making comparisons difficult across years), and least chub and their habitats are dynamic (with seasonally fluctuating water levels least chub may not retreat to the springhead habitats until after sampling is completed because of late rains or similar seasonal difference across years) (Crawford 1979, p. 11). Thus, CPUE and percentage of occupied sites were the only available measure to determine least chub status across sites (Hogrefe 2001, p. 4).

Knowing the limitations of the survey methods, signatories to the 2005 CCA (Bailey *et al.* 2005, entire) sought outside assistance in 2011, to develop a population viability analysis (PVA) and associated adaptive, decision-support tool (structured decision-making (SDM) model) (Peterson and Saenz 2011; p. 2–3). These tools are being developed to assess the current status of least chub populations (i.e., increasing, decreasing, or stable), provide information on population and community dynamics, and predict population responses to future anthropogenic development and conservation strategies. The PVA and SDM method will also allow for the integration of monitoring data so that reliable information on the status and distribution of least chub can be updated as data are collected, thus providing an evaluation of the success or failure of management actions to enhance existing populations and a basis for the development of future conservation decisions.

Interim findings are available (Peterson and Saenz 2011; entire), but the final population model and report are not anticipated until 2015. Thus far, the analysis reveals what the agencies believed to be true, that CPUE values were highly variable and heavily biased by sampling method (gear type and location of net deployment), making CPUE an unreliable indicator of least chub population status and trends (Peterson and Saenz 2013, p. 31). Once completed, the PVA model will incorporate environmental factors (i.e., precipitation and minimum temperatures the previous winter and spring), and habitat characteristics (i.e., percent open water and average depth) to provide a better indicator of least chub population status and trends in least chub occupancy at a site (occupancy rates), including whether a population is increasing, decreasing, or stable (Peterson and Saenz 2013, p. 27). The PVA would provide an immediate gauge of the population's probability to persist and remain reproductively successful in the long term (Peterson and Saenz 2013, p. 27).

The interim PVA model provides estimated occupancy probabilities for the least chub populations at Leland Harris Spring Complex, Bishop Springs Complex, Mills Valley, and Gandy Marsh. The model approximates the occupancy rates at 70 percent for Leland Harris and Bishop Springs, 60 percent for Mills Valley and, 30 percent for Gandy Marsh (Peterson and Saenz 2013, p. 28). These modeled occupancy probabilities are considered equilibrium values, where the occupancy rates at each site remain stable at these calculated rates for at least 100 years (Peterson and Saenz 2013, pp. 28, 70). These PVA estimations compared favorably to the 16 years of survey data available for Gandy Marsh (30–40 percent measured occupancy rate) and Bishop Springs (80 percent measured occupancy rate). This comparison of monitoring data with the PVA model provided sufficient evidence that occupancy rates are a defensible metric for evaluating the status and trends of least chub populations (Peterson and Saenz 2013, p. 28). The results indicate that the PVA model can reasonably approximate the habitat dynamics of major portions of the wetlands (i.e., depth and percent open water) and the occupation of the wetlands inhabited by least chub populations using annual survey data, and that these populations exhibit stable occupancy rates over time. Based on this information, we can infer that the model would provide similar results for the other populations that are not limited by other factors, such as mosquitofish presence (i.e., Mona Springs).

In addition to modeling the probability of least chub occupancy, the initial PVA model found that least chub populations generally displayed low probabilities of extirpation at the individual sites (Peterson and Saenz 2013, p. 29). The simulated mean time to extirpation was greater than 80 years for all populations under most simulated conditions except for the most extreme catastrophic disturbance probabilities (simulating a 90 percent habitat reduction) (Peterson and Saenz 2013, p. 30). Even under these extreme conditions, simulated mean time to extirpation exceeded 60 years for all populations evaluated (Peterson and Saenz 2013, p. 30). The authors suggest that the PVA should not be used as an absolute prediction of the likelihood of species extinction due to the intrinsic limitations of any model that uses incomplete information to predict future events (Reed *et al.* 2002, pp. 14–15). However, the results of the PVA indicate that all 15 natural and introduced least chub populations (with the exception of Mona Springs with mosquitofish present) exhibit consistent occupancy rates and have a high likelihood of persistence into the future (Peterson and Saenz 2013, pp. 54, 58).

Previous and Ongoing Conservation Efforts

Below we summarize the previous and ongoing conservation actions conducted through the 1998 and 2005 CCAs that provided conservation benefits to the least chub. The conservation actions which are described below have already been implemented by the LCCT, and we have concluded that they are effective at reducing threats to the species.

The partnership established under the 1998 CCA has been successful at implementing conservation measures to protect least chub. The document that served as the foundation for the conservation of least chub was the 1998 CCA, which was renewed in 2005 and amended in 2014 (see Future Conservation Efforts, below) (Perkins *et al.* 1998, entire; Bailey *et al.* 2005, entire; LCCT 2014, entire). The 1998 and 2005 CCAs resulted in the coordination and implementation of conservation efforts over the last 16 years, including: The acquisition and protection of occupied habitat, fencing (from grazing) of important habitat, genetic analysis of natural populations, annual monitoring (to evaluate population status, and habitat and population response to conservation actions), successful introduction of new least chub populations, the creation of MOUs with grazing operators on private lands, habitat restoration, and groundwater monitoring. A summary of these previous and ongoing conservation actions, by least chub population site, are described below.

(1) Mona Springs: Habitat in the vicinity of Mona Springs was originally privately owned, but the Mitigation Commission has acquired 84 ha (208 ac) of land since 1998, thus wholly protecting occupied least chub habitat at the site (Hines *et al.* 2008, p. 34; Wilson 2014, pers. comm.). The Mitigation Commission is a federal agency formed to fund and implement mitigation projects associated with the Central Utah Project (a federal water project authorized in 1956, to develop Utah's allotment of the Colorado River), and was signatory to the 1998 and 2005 CCAs. Livestock grazing was removed from the site in 2005, and habitat enhancement projects to deepen the springs and remove Russian olive (and other nonnative vegetation) began in 2011. Since 2000, UDWR continues to conduct nonnative fish removals at Mona Springs. In 2012, UDWR installed fish barriers and the number of juveniles collected during the 2013 sampling season was the highest on record, thus documenting successful recruitment for

the first time in many years (Grover and Crockett 2014, p. 17). As previously described, Mona Springs is not considered a viable, self-sustaining population; however, the ongoing efforts to stock Mona Springs have allowed us to maintain a population at this site, and efforts to successfully protect the habitat in perpetuity provide us with ongoing management options into the future.

(2) Leland Harris Spring Complex: Land ownership for least chub occupied habitat at Leland Harris is a combination of private (50 percent) and UDWR (40 percent) lands (following completion of a land swap with State and Institutional Trust Lands Administration (SITLA) in 2014), with about 10 percent owned by the BLM (Hines *et al.* 2008, pp. 41–42). Miller Spring (located in this complex) and its surrounding wetlands (approximately 20.2 ha (50 ac)) are privately owned but are managed under a grazing plan developed by the UDWR and the private landowner. Paddocks for rotational grazing and exclosures to reduce springhead access by cattle were completed at Miller Spring in 1998. As a result, livestock no longer congregate around the vulnerable wetland habitat and now use the upland areas (Crockett 2013, pers. comm.), and although least chub are not regularly monitored at Miller Spring, they are observed schooling along the shoreline each year during Columbia spotted frog (*Rana luteiventris*) surveys (Grover 2013, pers. comm.).

(3) Gandy Marsh: Land ownership includes BLM (70 percent), private lands (29 percent), and SITLA (1 percent). The BLM designated 919 ha (2,270 ac) as an Area of Critical Environmental Concern (ACEC) that is closed to oil and gas leasing to protect the least chub. The ACEC includes most of the lake bed and aquatic habitats and is fenced to exclude livestock (BLM 1992, pp. 11, 16, 18). Some springheads on the privately owned parcel were voluntarily exclosed by the landowner, significantly reducing the entrainment rate of livestock—livestock can become entrained (trapped) in soft spring deposits, where they can die, decompose, and pollute the springhead. Degraded springheads are prioritized and selected sites are restored on an annual, rotating basis to counteract the historical livestock damage. This restoration effort has resulted in increased least chub habitat and occupancy.

(4) Bishop Springs Complex: Land ownership includes BLM (50 percent), SITLA (40 percent), and private lands (10 percent). In 2006, UDWR and the Service entered into a candidate conservation agreement with assurances (CCAA) with the landowner to purchase water rights for Foote Reservoir and Bishop Twin Springs (USFWS 2006, entire). These water bodies provide most of the perennial water to the complex (Hines *et al.* 2008, p. 37). In 2008, UDWR obtained a permit for permanent change of use, providing for instream flow on a seasonal schedule. This instream flow helps to maintain water levels at Bishop Springs Complex, protecting the least chub (Hines *et al.* 2008, p. 37). Fencing around Foote Reservoir (Foote Spring) and North Twin Spring to exclude livestock was completed in 1993 (Wheeler 2014b, pers. comm.), and Russian olive removal was completed in 2012. These efforts have limited livestock access to least chub occupied habitat.

(5) Mills Valley: Nearly 80 percent of the occupied habitat at Mills Valley is privately owned, and the remaining 20 percent is owned by UDWR as the Mills Meadow Wildlife Management Area (WMA) (LCCT 2014, p. 14). Livestock grazing rights on the UDWR WMA were provided to adjacent landowners in exchange for UDWR and public access to UDWR property (Stahli and Crockett 2008, p. 5); however, the grazing rights were purchased back from the private landowner. In addition, the UDWR is encouraging landowners to participate in the programmatic CCAA to improve their current grazing management strategies (USFWS 2014a, entire).

(6) Clear Lake: This population was discovered in 2003 at the Clear Lake WMA, which is wholly owned and managed by UDWR. The site has a water right owned by UDWR. Common carp were prevalent at the site, but between 2003 and 2013, and through the implementation of the 2010 Clear Lake Aquatic Control Plan, UDWR successfully removed considerable numbers of common carp from the lake where they impacted vegetated habitat (Ottenbacher et al. 2010, entire). Removal efforts have significantly reduced the common carp population. Anecdotal evidence shows an increase in vegetated habitat and decrease in turbidity following these removal efforts (Wheeler 2014c, pers. comm).

Future Conservation Efforts

Despite the positive accomplishments of the 1998 CCA and 2005 CCA, our 2010 12-month finding (75 FR 35398) identified several threats that were still negatively acting on the least chub and its habitat. The remaining threats identified in the 2010 12-month finding included: (1) Continued habitat loss and degradation caused by livestock grazing; (2) groundwater withdrawal; (3) nonnative fishes; (4) the effects of climate change and drought; (4) and cumulative interaction of the individual factors listed above. The 2010 12-month finding also determined that existing regulatory mechanisms were not adequately addressing the threat of groundwater withdrawal to the species.

Based on information provided in the 2010 12-month finding, the LCCT partners met to evaluate the most recent least chub survey information and habitat conditions and amend the 2005 CCA. The resulting 2014 CCA amendment outlined several new conservation actions to address the threats that were identified in our 12-month finding: (1) Development and implementation of a programmatic candidate conservation agreement with assurances (CCAA) with private landowners; (2) the purchase of grazing rights on UDWR land; (3) completion of the population viability analysis (PVA) to evaluate natural and introduced populations and prioritize conservation strategies; (4) development of nonnative fish management plans; (5) additional fencing and habitat restoration of key sites; (6) maintenance and monitoring of introduced populations; and (7) completion of a study to evaluate the impact of groundwater level changes on habitat at a natural population site. A summary of specific conservation actions included in the 2014 CCA amendment are listed below in Table 2.

TABLE 2—THREATS TO THE LEAST HUB AS IDENTIFIED IN THE 2010 12-MONTH FINDING (75 FR 35398), THE PLANNED ACTIONS TO ADDRESS THOSE THREATS AS IDENTIFIED IN THE 2014 CCA AMENDMENT, AND THE STATUS OF THE ACTION

[LCCT 2014, Entire]

Threat	Agency	Conservation actions	Status
Livestock grazing	UDWR	Purchase of grazing rights for Mills Valley. Livestock to be removed September 2015.	Completed.
	UDWR, BLM	Maintain fencing on their respective lands	Annually.

TABLE 2—THREATS TO THE LEAST HUB AS IDENTIFIED IN THE 2010 12-MONTH FINDING (75 FR 35398), THE PLANNED ACTIONS TO ADDRESS THOSE THREATS AS IDENTIFIED IN THE 2014 CCA AMENDMENT, AND THE STATUS OF THE ACTION—Continued

[LCCT 2014, Entire]

Threat	Agency	Conservation actions	Status
	Service, UDWR	Encourage private landowners at Mills Valley, Leland, Gandy, and Bishop to enroll in the programmatic CCAA.	After CCAA completion.
	UDWR	Complete land-swap package at Leland Harris	Completed.
	BLM	Implement guidelines and plans when issuing or renewing grazing operator permits, and maintain Area of Critical Environmental Concern (ACEC) at Gandy.	Continuous.
	UDWR	Purchase privately owned parcels at Gandy and Bishop, if possible.	Anytime.
	BLM	Complete Bishop Springs fencing project	May 2015.
	UDWR	Enhance habitat of degraded areas	Annually.
	UDWR	Submit an annual report	Annually.
	All	Adaptively manage grazing at all applicable sites	As needed.
Ground-water withdrawal.	UDWR	Monitor least chub populations	Annually.
	Service, UDWR, BLM	Protest new water rights applications through the formal protest process if the applications for water infringe on water rights and lands with least chub.	Continuous.
	UDWR	Monitor water levels at introduced sites	Annually.
	UDWR	Review piezometer data and monitor groundwater levels at Snake Valley least chub population sites.	Annually.
	All	Review annual groundwater reports by Utah Geological Survey (UGS) and U.S. Geological Survey (USGS).	Annually.
	All	Use the new decision model to assess the continued stability and suitability of habitats to support least chub.	Annually.
	All	Integrate monitoring data into the decision model to reduce key uncertainties and improve future decision-making and provide a summary report annually.	1 year after completion of PVA.
	UDWR	Use Leland Harris habitat study (expected in 2015) to develop a water level and inundated habitat model.	After study completion.
	SNWA	Consider possible impacts of Southern Nevada Water Authority (SNWA) activities and plans on least chub and their habitat.	When applicable.
Nonnative fishes	UDWR	Design/implement nonnative fish management plans	May 2015.
	UDWR	Maintain, enforce and educate on UDWR code regulations for movement of nonnative fish species.	Continuous.
	All	Use new information in adaptive management planning	As needed.
Climate change and drought.	UDWR	Monitor piezometers, surface flow gages, and weather patterns at the Snake Valley wild population sites.	Annually.
	UDWR	Apply information from the Leland Harris habitat study (expected in 2015) to other sites.	Sept. 2015.
	All	Use PVA and decision tool to guide management under changes in drought and climate change conditions.	1 year after PVA completion.
	Service, UDWR	Evaluate introduced populations and UDWR to establish new populations to meet goals.	Continuous.
	UDWR, BLM	Russian olive removal at Bishop Springs	April 2015.
Cumulative effects	All	Addressing the threats listed above independently will prevent these threats from acting cumulatively.	Not applicable.

We have also completed an analysis of the certainty of implementation and effectiveness of these future actions pursuant to our Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE; 68 FR 15100, March 28, 2003; USFWS 2014b, entire), which is available on the Internet at *http://www.fws.gov/mountain-prairie/species/fish/leastchub/*. This analysis pertains only to actions that have not yet been implemented or have been implemented but are not yet shown to be effective (see PECE Analysis, below). Our analysis under PECE allows us to include future actions that have not yet been implemented or shown to be effective in our current threats analysis and status determination.

PECE Analysis

The purpose of PECE is to ensure consistent and adequate evaluation of recently formalized conservation efforts when making listing decisions. The policy provides guidance on how to evaluate conservation efforts that have not yet been implemented or have not yet demonstrated effectiveness. The evaluation focuses on the certainty that the conservation efforts will be implemented and effectiveness of the conservation efforts. The policy presents nine criteria for evaluating the certainty of implementation and six criteria for evaluating the certainty of effectiveness for conservation efforts. These criteria are not considered comprehensive evaluation criteria. The certainty of implementation and the effectiveness of a formalized conservation effort may also depend on species-specific, habitat-specific, location-specific, and effort-specific factors. To consider that a formalized conservation effort contributes to forming a basis for not listing a species, or listing a species as threatened rather than endangered, we must find that the conservation effort is sufficiently certain to be implemented, and effective, so as to have contributed to the elimination or adequate reduction of one or more threats to the species identified through the section 4(a)(1) analysis. The elimination or adequate reduction of section 4(a)(1) threats may lead to a determination that the species does not meet the definition of endangered or threatened, or is threatened rather than endangered.

An agreement or plan may contain numerous conservation efforts, not all of which are sufficiently certain to be implemented and effective. Those conservation efforts that are not sufficiently certain to be implemented and effective cannot contribute to a determination that listing is unnecessary, or a determination to list as threatened rather than endangered. Regardless of the adoption of a conservation agreement or plan, however, if the best available scientific and commercial data indicate that the species meets the definition of ''endangered species'' or ''threatened species'' on the day of the listing decision, then we must proceed with appropriate rulemaking activity under section 4 of the Act.

Using the criteria in PECE (68 FR 15100, March 28, 2003), we evaluated (for those measures not already implemented) the certainty of implementation and effectiveness of conservation measures pertaining to the least chub. We have determined that the measures will be effective at eliminating or reducing threats to the species because they protect and enhance occupied habitat (by reducing further grazing damage, restoring historically impacted areas, and removing nonnative fishes); commit to continued monitoring of populations; and provide new information, management direction, and analysis on the populations through the PVA model and implementation. We have a high degree of certainty that the measures will be implemented because the LCCT partners have a long track record of implementing conservation measures and CCAs for this species since 1998. Over approximately the past 16 years of implementation, UDWR, BLM, and the Mitigation Commission have implemented conservation actions to benefit least chub and its habitat, monitored their effectiveness, and adapted strategies as new information became available.

New conservation actions are prescribed by the 2014 CCA amendment and are already being implemented, such as the purchase of grazing rights on UDWR land, a land swap with SITLA, the creation and implementation of the PVA, habitat restoration, and data collection for the study to evaluate the effect of groundwater level changes on habitat at a natural population site. The 2014 CCA amendment has sufficient annual monitoring and reporting requirements to ensure that all of the conservation measures are implemented as planned, and are effective at removing threats to the least chub and its habitat. The collaboration among the CCA signatories requires regular committee meetings and involvement of all parties in order to fully implement the conservation agreement. Based on the successes of previous actions of the conservation committee, we have a high level of certainty that the conservation measures in the 2014 CCA amendment will be implemented (for those measures not already begun) and effective, and thus they can be considered as part of the basis for our final listing determination for the least chub.

Our detailed PECE analysis (USFWS 2014b, entire) on the 2014 CCA amendment (LCCT 2014, entire) is available for review at *http://www.regulations.gov* and *http://www.fws.gov/mountain-prairie/species/fish/leastchub/.*

Summary of Factors Affecting the Species

Section 4 of the Act and its implementing regulations (50 CFR 424) set forth the procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. Listing actions may be warranted based on any of the above threat factors, singly or in combination. Each of these factors is discussed below. In our previous analysis in the 2010 12-month finding (75 FR 35398), we did not evaluate introduced populations, which are now evaluated in this document (see ''Population Distribution,'' above).

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

The following potential threats that may affect the habitat or range of least chub are discussed in this section, including: (1) Livestock grazing; (2) oil and gas leasing and exploration; (3) mining; (4) urban and suburban development; (5) ground water and surface water withdrawal and diversion; and (6) drought.

Livestock Grazing

Livestock grazing was considered a threat to the species at the time of the 2010 12-month finding, particularly for the Snake Valley (Leland Harris, Gandy, Bishop Springs) and Mills Valley populations. Grazing animals can impact aquatic habitats in multiple ways. Livestock seek springs for food and water, both of which are limited in desert habitats; therefore, they spend a disproportionate amount of time in these areas (Stevens and Meretsky 2008, p. 29). As they spend time at springs, livestock eat and trample plants, compact local soils, and collapse the banks (Stevens and Meretsky 2008, p. 29). Input of organic wastes increases nutrient concentrations, and some nutrients (e.g., nitrogen compounds) can become toxic to fish (Taylor *et al.* 1989, in Stevens and Meretsky 2008, p. 29). Domestic livestock can also be trapped in soft spring deposits, die and decompose, and pollute the water, although this has happened infrequently. All of these effects can result in the loss or decline of native aquatic fauna (Stevens and Meretsky 2008, pp. 29–30) at site-specific locations.

Historical livestock grazing impacted five of the six naturally occurring least chub sites (Leland Harris, Gandy Marsh, Bishop Springs, Mills Valley, and Mona Springs). Despite some remaining localized impacts at a few of these locations, removal of grazing, implementation of conservation activities, continued monitoring efforts, habitat restoration, and private landowner agreements leading to modified grazing practices have decreased grazing pressure and resultant impacts at these sites since 2005 (Hines *et al.* 2008 pp. 22–23; LCCT 2014, pp. 18–19; Crockett 2013, pers. comm; Wheeler 2013b, pers. comm.). In addition, the LCCT has evaluated livestock grazing at successful introduced population sites and determined that all sites, except one (Pilot SE), have been protected from grazing since establishment, either through fencing or land management practices, and thus no grazing related impacts are present. The following discussion provides site-specific analysis of livestock grazing for all least chub populations.

The Clear Lake WMA and Mona Springs naturally occurring least chub populations are protected from livestock grazing by the management policies of

UDWR when Clear Lake WMA was established, and the Mitigation Commission in 2005, respectively. The UDWR never grazed livestock at the Clear Lake WMA and the Mitigation Commission removed grazing from Mona Springs in 2005 (Hines *et al.* 2008, p. 34, 45).

Livestock damage occurred at Gandy Marsh during periods of unmanaged overgrazing (Hines *et al.* 2008, p. 39; LCCT 2008b, p. 2). In August 2007, livestock damage was reported to be extensive when approximately 600 head of cattle were fenced into the northern area of Gandy Marsh (LCCT 2008b, p. 2; Wheeler 2013b, pers. comm.). However, the number of cattle has decreased to about 12 to 40 head (more than a 90 percent decrease) on this privately owned Gandy Marsh parcel since 2007, and the livestock entrainment rate significantly declined when the landowner voluntarily fenced about 50 percent of the springheads (Wheeler 2013b, pers. comm.). This change in management is the result of an informal, voluntary agreement initiated around 2008 between the landowner and the UDWR. The UDWR also manually restored 25 of the heavily impacted springheads at Gandy Marsh and least chub re-colonized 75 percent of those restored areas within several months (Wheeler 2013a, p. 3; Wheeler 2014a, p. 10). The BLM also installed fencing to protect springs on their lands at Gandy Marsh. Overall, 60 percent of the springs at Gandy Marsh are protected from livestock grazing by fencing (on both private and BLM lands), with nearly 80 percent of the habitat managed and regulated via grazing permits by BLM, and the remaining habitat managed for livestock grazing under the informal, voluntary agreement between UDWR and the landowner, which is expected to continue into the future since the exclosures in place since 2008, minimize livestock entrainment and loss, thereby providing benefits to landowner and encouraging a continuous agreement by the landowner with UDWR. The UDWR, as signatory to the 2014 CCA amendment, agrees to continue efforts to restore degraded habitat on an annual, rotating basis to counteract the historical livestock damage (LCCT 2014, p. 16).

Miller Spring and portions of the Leland Harris sites (within the Leland Harris Springs Complex) were previously considered unsuitable for least chub due to sedimentation, trampling, and poor water quality associated with livestock use, but extensive efforts by UDWR in 1999 and 2000, to restore and fence the spring significantly improved the habitat (Hogrefe 2001, pp. 7, 20). A rotational grazing plan was established through a wildlife extension agreement between the landowner and UDWR on 75 ha (188 ac) of Miller Spring and Leland Harris Springs (which also exhibited historical ungulate damage and bank disturbance) that resulted in improved habitat conditions at both sites (Hines *et al.* 2008, p. 42). Fencing of additional springs at Leland Harris in 2013 protected another 0.12 ha (0.3 ac) of habitat on private land and reduced livestock entrainment (Crockett 2013, pers. comm.). Survey data at Leland Harris indicate that least chub are widely distributed throughout the spring complex (UDWR 2012b, pp. II–17), and although least chub are not regularly monitored at Miller Spring, they are observed schooling along the shoreline each year during Columbia spotted frog (*Rana luteiventris*) surveys (Grover 2013, pers. comm.). Additional efforts to remove livestock grazing at Leland Harris include a recent land swap in 2014, between SITLA and UDWR, thereby protecting nearly 50 percent of the Leland Harris site, which is approximately 28 percent of the entire Leland Harris Springs Complex (LCCT 2014, p. 19). Overall, 28 percent of habitat at the Leland Harris Springs Complex has no livestock grazing, and the remainder of habitat is either under the grazing management plan through the 20-year wildlife extension agreement between UDWR and the landowner (67 percent) or actively managed for grazing by BLM (5 percent). As a signatory to the 2014 CCA amendment, the BLM ensures that its grazing permits are issued at levels sufficient to conserve least chub (e.g., turn out dates, number of cattle, rest periods; BLM 1988, entire), and has committed to continue to implement Utah Guidelines for Grazing Management (BLM 2011, entire) that protect least chub habitat when issuing or renewing grazing permits (LCCT 2014, p. 19) (see *Factor D. Inadequacy of Existing Regulatory Mechanisms,* below).

Foote Spring and North Twin Spring at the Bishop Spring Complex have been protected from livestock by fences since 1993, and Central Spring, although not fenced, is inaccessible to livestock due to its location in the center of the wetland complex. The remaining spring in the complex, South Twin Spring, was severely impacted by bank sloughing, resulting in shallower water, increased surface area, and sedimentation of the springhead in past years (Wheeler *et al.* 2004, p. 5). In 2014 and 2015, BLM will install a fence structure and water gap, improve bank stabilization, and reduce sediment deposition at the South Twin spring through funds provided by UDWR's Watershed Restoration Initiative, a conservation activity committed to in the 2014 CCA amendment (BLM 2014, entire; LCCT 2014, p. 19). Overall, 75 percent of springs at the Bishop Springs Complex are protected from livestock grazing (i.e., via fencing or livestock inaccessibility), and the remaining 25 percent of the springs will be fenced and protected from livestock grazing by 2015.

On the State-owned WMA portion of the Mills Valley site, grazing was allowed in return for UDWR access across private land to monitor least chub status. The damage due to overgrazing on this parcel was documented as moderate to severe in 2006 (UDWR 2006, pp. 27–28). The UDWR recently purchased the grazing rights for the parcel and grazing will be removed by September 2015 (LCCT 2014, p. 18). The remaining 80 percent of the least chub site is privately owned, but in general, only springs on the eastern edge of the wetland complex (approximately 50 percent of privately owned lands) have suffered from significant grazing impacts in the past (UDWR 2012b, pp. II–19, 20). In 2012, by targeting habitat restoration efforts and shifting the grazing patterns on a portion of the private lands previously impacted, habitat quality improved and no additional accumulation of sediment from grazing was detected after restoration at the sites (UDWR 2013a, p. II–8, 9; Grover 2013, pers. comm.). To further minimize the remaining livestock impacts at Mills Valley, the UDWR agrees to encourage private landowners to enroll in the programmatic CCAA (see discussions in Previous and Ongoing Conservation Efforts and Future Conservation Efforts sections, above), which will incorporate a grazing management plan with a rotational grazing schedule and establish a maximum number of grazing units, key rest periods, and livestock turn-out dates for the protection of least chub (LCCT 2014, p. 18). Overall, through UDWR management, 20 percent of least chub habitat at Mills Valley will have no livestock grazing by 2015.

As described previously, in 2013, the LCCT established formal introduction criteria for establishing new least chub populations (LCCT 2013a, entire). The criteria includes a thorough threat assessment and evaluation of the site; standards requiring that no livestock grazing occur at a site, or if there is grazing, it will be for an agreed-upon extent and duration that would not have negative impacts on least chub or their habitat; that livestock watering access be limited to a water gap (a notch in a fence surrounding a waterbody that allows for limited watering access for livestock) or off-site water source; that there are no apparent sedimentation issues; and that the site exhibits stable banks and minimal vegetation disturbance from livestock presence (UDWR 2013b, p. 2). Ten introduced sites meet the establishment criteria and are considered successful introductions, two of which have been established since the 2010 12-month finding. Six of these sites do not have livestock grazing; three sites are fenced and managed for livestock; and one site has seasonal livestock grazing, but there is no documented damage to least chub habitats associated with the seasonal livestock use (Allen 2014, pers. comm.). Overall, 90 percent of the successful introduced sites are protected from livestock grazing, and 10 percent (1 site) has low intensity, seasonal grazing with no documented habitat damage in the 6 years since its establishment.

In summary, historical livestock grazing was widespread across the majority of the natural populations and extensive livestock-related damage (i.e., entrainment, sedimentation, trampling) had occurred in the recent past at some of the natural sites. However, we find that completed efforts to protect the populations from grazing (e.g., fencing, livestock management, land and grazing rights acquisitions) and planned efforts under the 2014 CCA amendment (as described above under PECE Analysis) to continue to improve grazing management in least chub habitats provide an adequate amount of habitat protection from livestock grazing and contribute to the long-term conservation of the wetland and springs essential to least chub populations across the species' range.

Oil and Gas Leasing and Exploration

Oil and gas leasing and exploration was not considered a threat to least chub in our 2010 12-month finding, but our analysis did not previously evaluate introduced populations, which are now evaluated in this document. Oil and gas leasing and exploration can have direct and indirect impacts on springs, marshes, and riparian habitats. Vehicles, including drilling rigs and recording trucks, can crush vegetation, compact soils, and introduce exotic plant species (BLM 2008, pp. 4–9 to 4–20). Roads and well pads can affect local drainages and surface hydrology, and increase erosion and sedimentation (Matherne 2006, p. 35). Accidental spills (Etkin 2009, pp. 36–42, 56) can result in the release of hydrocarbon products into ground and surface waters (Stalfort 1998, section 1). Accumulations of contaminants in floodplains can result in lethal or sublethal impacts to endemic sensitive aquatic species (Stalfort 1998, section 4; Fleeger *et al.* 2003, p. 207).

The closest active well to a natural least chub population, as reported in our 2010 12-month finding, was 9.7 kilometers (km) (6 miles (mi)) away when evaluated using data from 2009 (Megown 2009a, entire). However, the activities associated with the active well 9.7 km (6 mi) away have not increased drilling operation and maintenance vehicle traffic near the least chub site, nor has there been evidence of compacted soils, soil erosion, crushed vegetation, or contamination runoff near the least chub site. Therefore, we consider this to be beyond the distance where least chub or their habitat would be reasonably affected. Using the most recent information from the State of Utah, Division of Oil, Gas and Mining (UDOGM) data, the same analysis in 2014 revealed no change; the well examined in 2009 remains the closest well to a natural least chub population (Jorgensen 2014a, entire). The closest active well in the UDOGM database to an introduced population is 49.9 km (31 mi) away (Jorgensen 2014a, entire). Since oil and gas leasing sites have not encroached closer than 9.7 km (6 mi) to the nearest natural least chub site in 5 years, wells are nearly 50 km (31 mi) from introduced least chub populations, and we are unaware of any plans for new exploration or development in these areas, oil and gas leasing and exploration is not considered a threat to the least chub.

Mining

Mining was not considered a threat to least chub at the time of our 2010 12-month finding, but our analysis did not previously evaluate introduced populations, which are now evaluated in this document. Peat mining has the potential to alter the hydrology and habitat complexity of bog areas with peat and humus resources (Olsen 2004, p. 6; Bailey *et al.* 2005, p. 31). Mills Valley was the only natural least chub population site containing peat and humus suitable for mining at the time of the 2010 12-month finding. In 2003, a Mills Valley landowner received a permit from UDOGM to conduct peat mining on their private land. Although one test hole was dug, no further peat mining occurred in this location. This peat mining permit is now inactive, and the operation has been abandoned (W. Western 2014, pers. comm), indicating that it is unlikely to be reinitiated as a viable project in the future. Past peat mining activities were unsuccessful in Mills Valley, and we are unaware of any future private or commercial peat mining proposals or permits, including any near or within introduced least chub sites (W. Western 2014, pers. comm.).

In summary, our analysis found one permit for peat removal in the Mills Valley least chub population area, but the attempt was abandoned. We are unaware of any additional private or commercial peat operation activities or permits at Mills Valley or any other natural or introduced least chub populations prior to or since the 2010 12-month finding. We conclude that peat mining is not a threat to the least chub.

Urban and Suburban Development

Urban and suburban development were not considered threats to the species at the time of the 2010 12-month finding, but our analysis did not previously evaluate introduced populations, which are now evaluated in this document. We acknowledge that historical development resulted in the loss of least chub habitats and populations across the species' range. The least chub was originally common throughout the Bonneville Basin in a variety of habitat types (Sigler and Miller 1963, p. 82). In many urbanized and agricultural areas, residential development and water development projects have effectively eliminated historical habitats and potential reintroduction sites for least chub (Keleher and Barker 2004, p. 4; Thompson 2005, p. 9). Development and urban encroachment either functionally or completely eliminated most springs, streams, and wetlands along the Wasatch Front (Keleher and Barker 2004, p. 2). Urban and suburban development affect least chub habitats through: (1) Changes to hydrology and sediment regimes; (2) inputs of pollution from human activities (contaminants, fertilizers, and pesticides); (3) introductions of nonnative plants and animals; and (4) alterations of springheads, stream banks, floodplains, and wetland habitats by increased diversions of surface flows and connected groundwater (Dunne and Leopold 1978, pp. 693–702).

At the time of our 2010 12-month finding, of the remaining natural sites, only the Mona Springs site (Keleher and Barker 2004, p. 4; Thompson 2005, p. 9) was considered vulnerable to rapid population growth along the Wasatch Front. At that time, the human population in the Mona Springs area was increasing and a housing development had expanded to within 1 km (0.6 mi) of the Mona Springs least chub site (Megown 2009b, entire). Since then, there has been no additional encroachment at the Mona Springs site, and we know of no additional urban development planned for the other natural least chub sites (Jorgensen 2014b, entire). Naturally occurring populations are more than 16 km (10 mi) away from population centers, and 40 percent of introduced sites are more than 80 km (50 mi) away (Jorgensen 2014d, entire).

Of the introduced population sites, only Escalante is near an urban interface (ponds are located on the property of the Escalante Elementary School in Salt Lake City), and we are unaware of any future development planned for this site. Two additional introduced sites are near the Wasatch Front, but they are more than 8 km (5 mi) from development, with the closest developed site located on military lands (not open to additional development) (Jorgensen 2014d, entire). There has been no alteration to the least chub-occupied spring habitats at these introduced sites, nor any evidence of increased sedimentation or contamination at the sites due to suburban or urban development within 8 km (5 mi); therefore, we consider this to be beyond the distance where least chub or their habitat would be reasonably affected.

Despite the effects of urban and suburban development on historical populations along the eastern portion of the least chub historical range, most of the remaining sites where least chub naturally occurs or was introduced occur in relatively remote portions of Utah with minimal human populations. We have no information indicating that urban or suburban development poses a threat to the least chub now or in the future.

Water Withdrawal and Diversion

Water withdrawals and diversions were considered a threat to the species at the time of the 2010 12-month finding. Our analysis was based on groundwater trends at the time and proposed large-scale groundwater development projects anticipated in the near future. However, there have been changes to the proposed groundwater development activities and additional information on groundwater is now available. Furthermore, successful conservation actions have been implemented since the 2010 12-month finding. Please refer to our ''Summary of Groundwater Withdrawal at Least Chub Populations Sites'' (USFWS 2014c, entire), which can be found on the Internet at *http://www.fws.gov/mountain-prairie/species/fish/leastchub/,* for a detailed description of the history and our current analysis of groundwater withdrawal in Utah and the Snake Valley (an interstate groundwater basin) and large-scale groundwater development projects. A summary is provided below.

Effects of Water Withdrawal

Hydrologic alterations, including water withdrawal and diversion, affect a variety of abiotic and biotic factors that regulate least chub population size and persistence. Abiotic factors include physical and chemical characteristics of the environment, such as water levels and temperature, while biotic factors include interactions with other individuals or other species (Deacon 2007, pp. 1–2). Water withdrawal directly reduces available habitat, impacting water depth, water surface area, and flows from springheads (Alley *et al.* 1999, p. 43). As available habitat decreases, the characteristics and value of the remaining habitat changes. Reductions in water availability to least chub habitat reduce the quantity and quality of the remaining habitat (Deacon 2007, p. 1).

Water withdrawal and diversion reduces the size of ponds, springs, and other water features that support least chub (Alley *et al.* 1999, p. 43). Assuming that the habitat remains at carrying capacity for the species or, in other words, assuming all population processes (e.g., birth rate and death rate) remain unchanged, smaller habitats support fewer individuals by offering fewer resources for the population (Deacon 2007, p. 1).

Particularly because least chub live in patchily distributed desert aquatic systems, reduction in habitat size also affects the quality of the habitat. Reduced water depth may isolate areas that would be hydrologically connected at higher water levels. Within least chub habitat, springheads offer stable environmental conditions, such as temperature and oxygen levels, for refugia and overwintering, but offer little food or vegetation (Deacon 2007, p. 2). In contrast, marsh areas offer vegetation for spawning and feeding, but exhibit wide fluctuations in environmental conditions (Crawford 1979, p. 63; Crist and Holden 1980, p. 804). Maintaining hydrologic connections between springheads and marsh areas is important because least chub migrate between these areas to access the full range of their ecological requirements (Crawford 1979, p. 63; Crist and Holden 1980, p. 804; Lamarra 1981, p. 10). As an example, flow reductions and periodic dewatering reduced available habitat in the wetland needed for least chub reproduction at Bishop Springs (Crawford 1979, p. 38; Lamarra 1981, p. 10; Wheeler *et al.* 2004, p. 5). Fortunately, UDWR's acquisition of water rights through a CCAA with a private landowner at Bishop Springs in 2006, and approval of a permanent change of use to provide instream flow to the Complex in 2008, addresses these historical low water conditions at the site (USFWS 2006, entire; Hines *et al.* 2008, p. 37).

Reductions in water may alter chemical and physical properties of aquatic habitats. As water quantity decreases, temperatures may rise (especially in desert ecosystems with little shade cover), dissolved oxygen may decrease, and the concentration of pollutants may increase (Alley *et al.* 1999, p. 41; Deacon 2007, p. 1). These modified habitat conditions could significantly impact least chub life-history processes, possibly beyond the state at which the species can survive. For example, the maximum growth rate for least chub less than 1 year of age occurs at 22.3 °C (72.1 °F). Temperatures above or below this have the potential to negatively impact growth and affect survival rates (Billman *et al.* 2006, p. 438).

Reduced habitat quality and quantity may cause niche overlaps with other fish species, increasing hybrid introgression, interspecific competition, and predation (see Factor C and E discussions). Reduction in spring flows reduces opportunities for habitat niche partitioning; therefore, fewer species are able to coexist. The effect is especially problematic with respect to introduced species. Native species may be able to coexist with introduced species in relatively large habitats (see Factor C discussion), but the native species become increasingly vulnerable to extirpation as habitat size diminishes (Deacon 2007, p. 2).

Habitat reduction may affect the species by altering individual success. Fish and other aquatic species tend to adjust their maximum size to the amount of habitat available, so reduced habitat may reduce the growth capacity of least chub (Smith 1981, in Deacon 2007, p. 2). Reproductive output decreases exponentially as fish size decreases (Smith 1981, in Deacon 2007, p. 2). Therefore, reduction of habitat volume in isolated desert springs and streams can reduce reproductive output (Deacon 2007, p. 2). Longevity also may be reduced resulting in fewer reproductive seasons (Deacon 2007, p. 2).

Current Groundwater Policy and Management

The Utah State Engineer (USE), through the Utah Division of Water Rights (UDWRi), is responsible for the administration of water rights, including the appropriation, distribution, and management of the State's surface and groundwater. This office has broad discretionary powers to implement the duties required by the office. For groundwater management, Utah is divided into groundwater basins and policy is determined by basin (UDWRi 2013, entire; UDWRi 2014a, entire). Based on the extent of groundwater development within each basin, they are either, open, closed or restricted to further appropriations.

In our 2010 12-month finding, we stated that water rights basins where natural populations of least chub occurred were either open or closed, but even closed basins allowed for additional groundwater pumping. Additionally, in our 2010 12-month finding, we reported that groundwater withdrawals were increasing in the closed basins and monitoring wells were showing declines in water levels based on information in the U.S. Geological Survey (USGS) and UDWRi annual *Groundwater Conditions in Utah Report* (Burden 2009, entire). For example, the water rights basins corresponding to the Mona Springs, Mills Valley, and Clear Lake WMA least chub populations were listed as closed, but the annual *Groundwater Conditions in Utah Report* reported new wells drilled in these basins (Burden 2009, p. 5). From this information, it appeared that additional groundwater withdrawals were being authorized for these basins by the USE. Thus, our analysis concluded that these basins were in effect still open to additional groundwater pumping which posed a threat to all least chub populations.

Since we made our 12-month finding in 2010, we reevaluated the information concerning the reported new well records based upon information provided by UDWRi's online water rights and well log database, and we determined that they were replacement wells for similar pumping capacities and not additional appropriations of groundwater (UDWRi 2013, entire; USFWS 2014c, p. 6; Greer 2013, pers. comm.). Additionally, the UDWRi Assistant State Engineer confirmed that the basins corresponding to the Mona Springs, Mills Valley, and Clear Lake WMA naturally occurring least chub populations were closed, and no new appropriations have been approved since the closure following the groundwater policies implemented in 1995, 1997, and 2003, for the basins, respectively (Greer 2013, pers. comm.; UDWRi 1995, entire; UDWRi 1997, entire; UDWRi 2003, entire; UDWRi 2013, entire).

In addition, we reevaluated the available monitoring well data, which previously indicated declines in water levels (Burden 2009, pp. 41–43, 46–50, 53–55). Our recent analysis of the monitoring well reports indicates that while water levels fluctuate, they are not in decline, and have increased slightly since 2010 (Burden 2013, pp. 41–43, 46–50, 53–55). In our 2010 12-month finding, we concluded that there were increasing groundwater withdrawals in the closed basins (populations in closed basins are discussed above), suggesting that additional withdrawals had been granted. However, we now know that withdrawals have decreased since 2010 in the Sevier Desert (Clear Lake population) basin or maintained a fairly similar average to those reported in 2010 (Burden 2013, pp. 5–6). Although we originally reported changes in water withdrawals from the closed basins as evidence of additional withdrawals, they are within the appropriated water rights issued by USE prior to the basin closure policies. Annual variation in precipitation explain some of the differences in groundwater withdrawals between years in these closed basins, with drought years corresponding to increases and wet years with decreases in withdrawals (USFWS 2014c, p. 6). In addition, not all water rights appropriated are pumped at the same volume each year; thus, differences occur among years based on the pumping regime of the water right holder (USFWS 2014c, p. 6; J. Greer 2013, pers. comm.).

Although no studies have quantitatively characterized the available least chub habitat associated with fluctuations in groundwater withdrawals, the best available information indicates that the water levels have remained relatively stable and available habitat has remained consistent seasonally for least chub at Mona Springs and Mills Valley, but has shown declines in the past at Clear Lake WMA (UDWR 2012a, pp. II–19–20, III–4; Wheeler 2014c, pers. comm.; Grover 2014, pers. comm.). However, the water right owned by UDWR at Clear Lake WMA, which retains water on-site, provides additional assurance that water will be available for the site in the event of drying or other climatic conditions. Therefore, with this new and clarified information, we believe the closed basins protect least chub populations at Mona Springs, Mills Valley, and Clear Lake WMA by preventing further groundwater development.

Three naturally occurring least chub populations occur within the Snake Valley UDWRi groundwater basin, which remains open to appropriations (see ''Localized Pumping in Snake Valley,'' below). Of the three populations occurring in the Snake Valley, two have secured water rights owned by the UDWR and BLM, authorizing a combination of instream flow, and wildlife and riparian habitat uses for the water, which retains additional water on-site by providing an additional 3 cubic feet per second (cfs) above the natural flow at each site (UDWRi 2014b, p. 1–8). These water rights provide additional security and legally ensure senior rights over any new appropriations in the vicinity of these sites, as well as provide water for the site beyond that provided by the natural base flow. Overall, three of the six natural least chub sites occur in UDWRi closed basins and of the remaining three sites (Snake Valley), two sites have secured water rights; thus five of the six natural least chub sites are either fully protected via water rights policy or are secured by existing water rights that provide additional water for the sites.

Least chub introduced populations are located primarily in the northern portion of the Bonneville Basin, which spans numerous UDWRi groundwater basins. The majority of the introduced least chub populations (90 percent) are within open or restricted basins, except Escalante, which is located within a closed basin under the policy of the Salt Lake Valley Groundwater Management Plan, finalized in 2002 (UDWRi 2002, entire). Despite the water right basin status, all introduced population sites have associated water rights that authorize water to be retained on-site through various ''purposes of use,'' including for fish culture use, as a pond and habitat study, and for stockwatering (which is approved for use by both wild and domestic animals as well as natural plant life in the area). Thus, stable water levels can generally be maintained at these sites from natural base flows, but water retained on-site through the water rights adds additional security. The security is provided by the legal assurance of senior rights over any new appropriations in the vicinity of these sites.

In summary, five of six natural least chub populations have existing water rights or occur in closed basins. All of the introduced least chub populations have existing water rights, which provide water on site for least chub and are held by a combination of owners, including BLM, UDWR, Utah State Parks, local government, Department of Defense, and private landowners. The ownership of a water right legally ensures the senior rights over any new appropriations in their respective vicinities and retains the water on-site for use by least chub, beyond the amount provided by natural flow. Therefore, we conclude that groundwater withdrawal is not anticipated to occur at a level that will pose a threat to least chub populations.

Current Status of Large-Scale Snake Valley Groundwater Pumping

Our 2010 12-month finding considered the proposed large-scale groundwater withdrawals from the Snake Valley aquifer to be one of the most significant threats to least chub populations. At the time of our 2010 12-month finding, several applications for large-scale groundwater withdrawal from the Snake Valley aquifer were pending, including water rights for Southern Nevada Water Authority (SNWA), appropriation of groundwater by the Central Iron County Water Conservancy District and Beaver County, Utah, and an increase of water development by the Confederated Tribes of the Goshute Reservation (SNWA 2008, p. 1–6). Of greatest concern was the SNWA Groundwater Development (GWD) Project, proposing conveyance of up to 170,000 acre-feet per year (afy) of groundwater from hydrographic basins (approximately 50,600 afy from Snake Valley) in Clark, Lincoln, and White Pine Counties, Nevada, to SNWA member agencies and the Lincoln County Water Conservancy District in Las Vegas (SNWA 2008, pp. 1–1, 1–6, Table 1–1). The SNWA had also applied to the BLM for issuance of rights-of-way to construct and operate a system of regional water supply and conveyance facilities to transport water to Las Vegas (SNWA 2008, p. 1–3).

In 1990, Department of the Interior (DOI) agencies protested water rights applications in Spring and Snake Valleys, based in part on potential impacts to water-dependent natural resources (Plenert 1990, p. 1; Nevada State Engineer (NSE) 2007, p. 11). In 2006, DOI agencies reached a stipulated agreement with SNWA for the Spring Valley water rights applications and withdrew their protests (NSE 2007, p. 11). For groundwater pumping planned in Spring Valley, the stipulated agreement established a process for developing and implementing hydrological and biological monitoring, management, and mitigation for biological impacts (NSE 2007, p. 11).

The Utah Geological Survey (UGS) began evaluating Snake Valley in 2004, due to concerns over the proposed groundwater development by SNWA (UGS 2013, p. 1.2–4). Because monitoring of baseline groundwater conditions was relevant to future water-management, the Utah Legislature requested UGS to establish a long-term (50+ years) groundwater-monitoring network in Snake Valley to determine the baseline groundwater conditions and measure changes if future groundwater development were to occur (UGS 2013, p. 1.2–4). The well network was completed in December 2009. The UGS groundwater-monitoring network consists of 60 piezometers (wells open to the aquifers) to measure groundwater levels and surface-flow gages to measure spring discharge (UGS 2013, Abstract p. 3). The monitoring sites were selected adjacent to the Snake Valley portion of the proposed SNWA GWD Project and coincide with areas of current agricultural groundwater pumping, environmentally sensitive and economically important springs, and along possible areas of interbasin flow (UGS 2013, Abstract p. 3).

Although all SNWA facilities were planned for development in Nevada, associated pumping from the Utah-Nevada shared Snake Valley Basin (SNWA 2008, p. 1–1) was expected to affect Utah groundwater resources and consequently habitats of the least chub (Welch *et al.* 2007, p. 82). However, prior to any approved groundwater withdrawals from the shared basin, federal legislation (known as the Lincoln County Conservation, Recreation, and Development Act of 2004) requires that the two States shall reach an agreement regarding the division of the water sources prior to any transbasin diversion (Pub. L. 108–424, 118 Stat. 2403, sec. 301(e)(3), November 30, 2004). To date, no agreement between Utah and Nevada has been signed. Thus, there are significant procedural hurdles to overcome before large-scale groundwater development could occur in the Snake Valley.

Since the 2010 12-month finding, the Nevada State Engineer (NSE), in March 2012, granted groundwater rights to SNWA for Delamar, Dry Lake, Cave, and Spring valleys, but not for Snake Valley. However, SNWA's approved groundwater rights require pipeline development and conveyance of the water from these east-central Nevada valleys to southern Nevada, across BLM land. The BLM published a record of decision (ROD) in December 2012, authorizing SNWA groundwater conveyance across BLM lands in Delamar, Dry Lake, Cave, and Spring valleys in Nevada, but not Snake Valley, and the amount that can be conveyed is limited to 83,988 afy (BLM 2012b, p. 36). Thus, the SNWA GWD Project is not currently authorized to develop groundwater from the Snake Valley.

The BLM's ROD and final environmental impact statement (FEIS) for the SNWA GWD Project described hydrological model simulations that were developed to evaluate the probable long-term effects of groundwater withdrawal from the project and selected alternative on a regional scale (BLM 2012b, p. 16; Service 2014c, entire). The model evaluated predicted drawdowns across three time series; at full build-out, full build-out plus 75 years, and full build-out plus 200 years. Comparison of the simulation results for the three points in time indicates that the drawdown area continues to progressively expand as pumping continues into the future (BLM 2012a, p. 3.3–179; BLM 2012b, pp. 16, 17). However, even at full build-out, the drawdown areas are localized in the vicinity of the pumping wells in central and southern Spring Valley, southern Cave Valley, and Dry Lake Valley; drawdown in excess of 10 feet would not occur in the Snake Valley (BLM 2012a, p. 3.3–179).

At the full build-out plus 75 years timeframe, there are two distinct drawdown areas (BLM 2012a, p. 3.3–184). The northern drawdown area encompasses most of the valley floor in Spring Valley, and extends into northern Hamlin Valley and along the southwest margin of Snake Valley (BLM 2012a, p. 3.3–184). The Snake Valley least chub populations are located in the northeast portion of Snake Valley and would be approximately 32–40 km (20–25 mi) from the edge of the drawdown area, reasonably considered to be beyond the distance where the least chub habitat would be affected. The southern drawdown area extends across the Delamar, Dry Lake, and Cave valleys in a north-south direction (BLM 2012a, p. 3.3–184) where least chub do not occur. By the full build-out plus 200 years timeframe, the two drawdown areas merge into one that extends approximately 305 km (190 mi) in a north-south direction and up to 80 km (50 mi) in an east-west direction, flanking the southwestern edge of the Snake Valley basin (BLM 2012a, p. 3.3–184). In this scenario, the drawdown area is still approximately 24–32 km (15–20 mi) from the closest least chub population in Snake Valley, which we consider to be beyond the distance where least chub habitat would be affected, because pumping generally only affects groundwater levels in monitoring wells up to 8 km (5 mi) from their pumping center, based on localized pumping information (UGS 2013, p. 5.3.7–35) (see ''Localized Pumping in Snake Valley,'' below). In short, the selected alternative shows no drawdowns in the vicinity of the Snake Valley least chub populations, even 200 years after full build-out.

Because these drawdown predictions are based on groundwater models, there are intrinsic limitations that should be considered with any interpretive effort. The model may underestimate groundwater drawdowns because it was developed for regional scale analysis and does not consider changes in groundwater elevation of less than 3 meters (m) (10 feet (ft)) (BLM 2012a, p. 3.3–87). Thus, the geographical extent of groundwater drawdown could be greater than what is presented in the analysis, and the extent and timing of these effects could vary among springs, based on their distance from extraction sites and location relative to regional groundwater flow paths (Patten *et al.* 2007, pp. 398–399). Despite these limitations, this model is the most advanced analysis currently available to evaluate pumping impacts from the SNWA GWD Project, and any modeled impacts would have to increase by 24–32 km (15–20 mi) to reach habitat occupied by least chub 200 years after full build-out; we consider this level of disparity to be unlikely. In addition, the UGS monitoring well network (see the beginning of the ''Current Status of Large-Scale Snake Valley Groundwater Pumping'' section) will be used to evaluate groundwater drawdowns and changes in spring discharge rates within the vicinity of the Snake Valley least chub populations. Because SNWA has agreed to avoid and mitigate for any impacts to least chub and their habitat in the 2014 CCA amendment (LCCT 2014, p. 20), it is anticipated that UGS monitoring data will be used to initiate discussions to change groundwater pumping if impacts are found to occur (as described in more detail below).

Although the BLM authorized the SNWA GWD Project conveyance for all valleys except Snake Valley, and water rights for those valleys were granted by NSE, on December 10, 2013, the Seventh Judicial District Court in Nevada heard petitions and remanded the NSE orders that granted the water rights to SNWA in Delamar, Dry Lake, Cave, and Spring valleys (Seventh Judicial District Court, Nevada 2013, p. 1). The Court, through the remand, has required the following: Recalculation of water available from the respective basins; additional hydrological study of Delamar, Dry Lake and Cave valleys; and establishment of standards for mitigation in the event of a conflict with existing water rights or unreasonable effects to the environment or the public interest (Seventh Judicial District Court, Nevada 2013, pp. 1, 2). It is unclear how the requirements by the courts will operate in conjunction with the stipulated agreement and how the NSE will define standards, thresholds, and triggers for mitigation. With these uncertainties, the SNWA GWD Project in Delamar, Dry Lake, Cave, and Spring valleys will likely be delayed until further analysis is completed.

In summary, the SNWA GWD project was not approved for Snake Valley, the location of known least chub populations. Drawdowns from pumping in Spring Valley, if it occurs, are not anticipated to affect least chub populations even 200 years following full build-out, based on the best available analysis. Recent court decisions have lent uncertainty toward the future ability to complete the SNWA Project in Spring Valley, a valley outside the historical range of least chub. Based on available hydrologic modeling, we do not anticipate that the SNWA GWD project, if it occurs, will pose a threat to least chub.

Other Proposed Large-Scale Water Development Projects Within or Near Snake Valley

In our 2010 12-month finding, other large-scale water development projects were anticipated or completed, and included: (1) Beaver County, Utah, for appropriations in Wah Wah, Pine, and Hamlin valleys (UDWRi 2009b, pp. 2, 5, 8); (2) SITLA for up to 9,600 afy from underground water wells across the Snake Valley; (3) Central Iron County (Utah) Water Conservancy District for appropriations in Hamlin Valley, Pine Valley, and Wah Wah valleys (UDWRi 2009a, pp. 2, 12, 23); and (4) The Confederated Tribes of the Goshute Reservation (located in east-central Nevada and west-central Utah) for an increase their Deep Creek basin rights (Steele 2008, p. 3).

To evaluate the potential effects of these four large-scale water development projects on least chub and their habitat, we first evaluated the project's current water rights status (rejected, pending, or approved). Then, if found to be pending or approved, we determined if it occurs within the same or a different regional groundwater flow system as the Snake Valley least chub populations (i.e., hydrologically connected). Lastly, we measured the proximity of the water development project to least chub habitat if it was located within the same regional groundwater flow system, as distance between groundwater development and least chub populations can be an indicator of potential impacts, as described below.

Through their efforts to monitor Snake Valley groundwater with a monitoring well network, UGS determined that localized agricultural groundwater pumping has the potential to affect groundwater levels in monitoring wells up to 8 km (5 mi) from their pumping center, as evidenced by a distinct change in monitoring well water level during irrigation season (UGS 2013, p. 5.3.7–35). Despite observing this relationship between groundwater pumping and distance affected, they also found that not all pumping activities within 8 km (5 mi) cause changes in monitoring well water levels, as distance from aquifer recharge areas, and duration and the intensity of pumping activities can be complicating factors (UGS 2013, p. 5.3.7–35). Thus, within an 8-km (5-mi) distance from groundwater pumping, additional analysis is necessary to characterize pumping impacts. Based on this information, 8 km (5 mi) was considered a reasonable threshold distance of a least chub site from a pumping location. If groundwater withdrawal wells were located closer than this, either water level trends at the population sites or changes in monitoring well water levels near the sites were used in our analysis to determine if groundwater pumping was affecting least chub population sites (see ''Localized Pumping in Snake Valley,'' below, for additional descriptions of monitoring well trends at least chub populations sites).

Our 2010 12-month finding reported that the Beaver County applications were rejected by the USE (UDWRi 2009b, pp. 3, 6, 9) and that the SITLA water rights were granted in 2005 for 9,600 afy in the Snake Valley. This information remains correct, but further analysis revealed that the SITLA water rights are for 12 separate wells across the Snake Valley: 1 well at Bishop Springs, 1 near Gandy Marsh (6 km (4 mi)) away from the nearest least chub population), 3 wells north of the nearest least chub population (10 km (6 mi) away), and 7 wells south of the nearest least chub population (ranging from 30 to 50 km (20 to 30 mi) away) (UDWRi 2009c, entire; UDWRi 2014c, entire). These wells have been active for 9 years, with 2 wells occurring within 8 km (5 mi) of least chub habitat. Several of those 9 years overlap with the drawdowns experienced at Bishop Springs prior to water right acquisition at the site (although a relationship cannot be not confirmed). However, since the water right held by UDWR was approved in 2008 for instream flows to benefit wildlife at Bishop Springs, drawdowns have not occurred at the site, based on annual monitoring surveys. Furthermore, the UGS well network has not detected drawdowns at the site since piezometer installation in 2009. It is certainly possible that withdrawals by SITLA near the site have affected Bishop Springs in the past, but the water right held by UDWR providing instream flow has maintained suitable flows for least chub at the site since its acquisition in 2008.

Central Iron County water rights hearings were held in 2010, but the applications remain unapproved by USE (UDWRi 2014c, p. 1–9). It is uncertain when or if the water rights will be approved. However, the locations of the appropriations are in Hamlin Valley, Pine Valley, and Wah Wah valleys (UDWRi 2014c, p. 1–9). Pine and Wah Wah valleys are adjacent to, and are within the same regional groundwater flow system (Great Salt Lake Desert (GSLD) system) as Snake Valley, but the hydrological connection to Snake Valley or its least chub populations is not clear (Welch *et al.* 2007, p. 5). However, Hamlin Valley is hydrologically connected to Snake Valley in the south (Welch *et al.* 2007, p. 5), but the northernmost Central Iron County water right application site is nearly 160 km (100 mi) south of the nearest least chub population, which is reasonably considered to be beyond the distance where the least chub habitat would be affected.

The Confederated Tribes of the Goshute Reservation application from the Deep Creek Valley remains unapproved due to numerous protests, associated hearings, and the application is currently being reconsidered by USE (UDWRi 2014c, pp. 10–14). Deep Creek Valley is adjacent to Snake Valley, but is part of Goshute Valley regional groundwater flow system, which is not connected to Snake Valley or its associated GSLD regional flow system (Welch *et al.* 2007, p. 5). Thus, we do not expect that any potential approval and use of these water rights would impact least chub sites because the rights would be located in a different regional groundwater flow system and no least chub populations are located within this other groundwater system.

In summary, current and proposed large groundwater development acquisitions, including SITLA, Central Iron County, and the Confederated Tribes of the Goshute Reservation, are not noticeably causing drawdowns, are located more than 8 km (5 mi) from the nearest least chub populations, or are not hydrologically connected to the regional flow system of the Snake Valley, respectively, and thus not anticipated to impact least chub populations in the Snake Valley.

Localized Pumping in Snake Valley

Smaller, localized groundwater development has the potential to decrease flow from springs, including those supporting least chub. In our 2010 12-month finding (75 FR 35398), we concluded that agricultural pumping, combined with drought, has affected several springs in Snake Valley. These include Knoll Spring near the agricultural town of Eskdale and springs on private properties in the agricultural town of Callao (Sabey 2008, p. 2). These sites were all historically documented locations of least chub that no longer harbor the species (Hickman 1989, pp. 16–17; Garland 2007, pers. comm.).

Since the publication of our 2010 12-month finding, UGS conducted extensive research of ground and surface water hydrology in Snake Valley. UGS found that groundwater-level hydrographs at monitoring sites in the UGS study area vary according to distance from areas of groundwater pumping and by their distance from recharge areas (UGS 2013, p. 5.3.7–35). Groundwater levels at sites within about 8 km (5 mi) of agricultural areas can show seasonal response to groundwater pumping, if pumping is severe enough to cause declines (UGS 2013, p. 5.3.7–35).

The UGS found that groundwater levels near spring heads naturally fluctuate by up to 0.9 m (3 ft) per year in response to seasonal changes in evapotranspiration rates, but that they are not declining from year to year (UGS 2013, Abstract p. 3). For spring-gradient sites near least chub populations, groundwater levels in the piezometers naturally fluctuated by about 0.15–0.91 m (0.5 to 3 ft) seasonally, with lowest levels during the summer months and highest levels during the late winter/early spring months, in response to evapotranspiration in the spring-fed wetlands ecosystems that are supported by the spring flow and not from groundwater withdrawals (UGS 2013, p. 5.3.4–26).

We analyzed the number of local wells in the vicinity of Snake Valley least chub populations to determine how local groundwater pumping may be affecting the species. Because UGS determined that localized agricultural groundwater pumping can affect groundwater levels in monitoring wells up to 8 km (5 mi) from their pumping center, as evidenced by a distinct change in monitoring well water level during irrigation season (UGS 2013, p. 5.3.7–35), we used this measure to identify our analysis area. The number of water rights within this distance of the Snake Valley least chub sites were evaluated.

Although there are several wells and spring withdrawals near least chub sites, including one new well in 2012 (Jorgensen 2014c, entire), in general, the Snake Valley least chub population sites show stable groundwater levels since piezometer installations in 2009 (Hurlow 2013, pers. comm.), with the exception of Gandy Marsh. Unlike the sites to the north (Leland and Miller) and to the south (Bishop), the Gandy piezometers showed a slight downward trend. Gandy's downward trend is likely due to natural cyclic climatic variation and not agricultural withdrawals, similar to the trends seen in the UGS remote sites which are not influenced by local pumping; thus Gandy Marsh is not influenced by local pumping and is only showing a slight downward trend due to climatic variation, like the trends exhibited at the remote monitoring sites which are not influenced by pumping (Taylor and Alley, 2001, pp . 15–16 *in* UGS 2013, p. 5.3.7–31; Hurlow 2013, pers. comm.). To date, UGS has not detected effects of irrigation pumping and drawdowns at these least chub sites due to the current pumping activities, but UGS should be able to detect future changes (if they do occur) through the monitoring well network currently in place (UGS 2013, p. 5.1–1). Not only have the Bishop Springs and Gandy Marsh sites been able to provide sufficient habitat and maintained stable numbers of least chub, but they also have existing water rights held by the BLM and UDWR (UDWRi 2014b, p. 1–8) that provide additional water for least chub beyond the natural flows supplied from the on-site springs (totaling 3.0 cfs per site) (UDWR 2013a, entire; UDWR 2013b, entire).

Current allocated water rights for the entire Snake Valley are 12,000 afy in Nevada and 55,000 afy in Utah (including 20,000 afy reserved for the Service's water rights for Fish Springs National Wildlife Refuge) (UGS 2013, pp. 9.2–1,2). Sustainable yield calculations (as outlined in the original draft interstate agreement, referenced above, which remains unsigned), would include new development of 35,000 afy in Nevada and 6,000 afy in Utah, if the maximum allowed development were to occur (UGS 2013, p. 9.2–1,2). Thus an additional 6,000 afy could be developed in Utah's Snake Valley and not exceed the USE calculated sustainable yield.

The UGS suggests that based on the distribution of recent water rights applications, most of the new groundwater development would likely occur in central and southern Snake Valley (UGS 2013, p. 9.2–2). Most of the current use is for irrigation in south-central Snake Valley near Garrison and Eskdale, Utah, and Baker, Nevada, and in southern Snake Valley in Nevada and Utah (UGS 2013, p. 9.2–2). Because the Snake Valley least chub populations are located in the northeast portion of the valley and would be approximately 30 to 50 km (20 to 30 mi) from these agricultural areas, it is unlikely that these withdrawals would impact the least chub Snake Valley populations, but UGS should be able to detect future changes (if they do occur) through the monitoring well network currently in place (UGS 2013, p. 5.1–1).

Summary of Water Withdrawal and Diversion

Least chub populations occur within several groundwater basins in Utah, where 25 percent occur in basins closed to groundwater withdrawal (natural and introduced), 25 percent occur in restricted basins, and 50 percent occur in basins open to unrestricted groundwater withdrawal. Eighty percent of all these populations have secured water rights, which provide onsite water available for the least chub. Those without water rights occur in closed basins (Mona Springs, Mills Valley) that provide protection from additional groundwater withdrawals, or are in basins where groundwater levels are monitored (i.e., Leland Harris in Snake Valley monitored by UGS wells). We have also concluded that the SNWA GWD Project will not impact least chub populations due to the exclusion of Snake Valley (and its least chub populations) from authorizations and modeling that demonstrates Spring Valley water withdrawals will not result in drawdowns near the Snake Valley least chub populations. In addition, data from UGS do not suggest that there are impacts from local pumping on least chub populations in the Snake Valley. Overall, based on updated information, water withdrawal and diversion are not considered a threat to the least chub.

Drought

In our 2010 12-month finding (75 FR 35398), we concluded that drought was not a threat on its own, but was a threat to the least chub when considered cumulatively with water withdrawals. Prolonged droughts have primary and secondary effects on groundwater resources. Decreased precipitation leads to decreased recharge of aquifers. Decreased surface-water resources generally lead to increased groundwater withdrawal and increased requests for water-well construction permits (Hutson *et al.* 2004, p. 40; Burden 2009, p. 2). Past and future climatic conditions (see ''Climate Change'' section under Factor E) influence the water available to both water development and aquatic habitats, with water development usually taking priority.

The impacts to least chub habitat from drought can include: Reduction in habitat carrying capacity; lack of connectivity resulting in isolation of habitats and resources; alteration of physical and chemical properties of the habitat, such as temperature, oxygen, and pollutants; vegetation changes; niche overlap resulting in hybridization, competition, and predation; and reduced size and reproductive output (Alley *et al.* 1999, pp. 41, 43; Deacon 2007, pp. 1–2). These impacts are similar to those associated with water withdrawal and diversions, as described under Factor A.

Least chub have survived for thousands of years with intermittent natural drought conditions. As described in our 2010 12-month finding (75 FR 35398), the effects of drought were considered a threat because we were concerned that ongoing and proposed large-scale water withdrawals would exacerbate impacts to the least chub. The cumulative impact of drought and water development for irrigation has led to the loss of springs in the Snake Valley, including those on the Bagley and Garland Ranches (Garland 2007, pers. comm.).

However, we no longer conclude that drought is a threat to the least chub in combination with water withdrawals because of changes to our understanding of water withdrawals, and ongoing conservation actions and amendments in the 2014 CCA. As described above (see ''Water Withdrawal and Diversion''), the Snake Valley was recently excluded from the SNWA GWD Project, so that project is not anticipated to result in drawdowns at Snake Valley least chub sites. In addition, there is only slow development of groundwater in the vicinity of the Snake Valley least chub sites and most sites maintain secure water rights or are located in closed basins. Conservation actions in the 2014 CCA amendment also moderate the effects of drought by ensuring connectivity within sites and prioritizing for restoration or habitat modification, so that habitat corridors remain open for least chub (see discussions in Previous and Ongoing Conservation Efforts and Future Conservation Efforts sections, above). Therefore, drought is not considered a threat to the species.

Summary of Factor A

At this time, based on best available information, and the addition of successful introduced populations, past conservation actions and anticipated conservation actions under the 2014 CCA amendment, and new information concerning the future of water development in the Snake and Spring valleys, we conclude that livestock grazing, mining, oil and gas leasing and exploration, urban and suburban development, water withdrawal and diversion, and drought do not pose a threat to least chub. Although loss of habitat from urban development and groundwater withdrawals extirpated least chub from all but a fraction of its historical range, we find that the present or threatened destruction, modification, or curtailment of the species' habitat or range does not pose a threat to the species now or in the future.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Overutilization for commercial, recreational, scientific, or educational purposes was not considered a threat to least chub in our 2010 12-month finding (75 FR 35398). Commercial, recreational, scientific, and educational utilizations are not common least chub-related activities, and protections are in place to limit their effect on the species. Least chub are considered a ''prohibited'' species under Utah's Collection Importation and Possession of Zoological Animals Rule (R–657–3–1), which makes it unlawful to collect or possess least chub without a permit. Between 2002 and 2010, two permits were issued by UDWR for survey of least chub in the wild, and all least chub collected under the permits were released unharmed (Wilson 2009b, p. 1). No new permits have been issued since 2010 (Mellon 2014, pers. comm.). Use of least chub for scientific or educational purposes is also controlled by UDWR, and the agency typically provides least chub from fish hatchery stocks for these purposes (Wilson 2009b, pp. 1–4; Mellon 2014, pers. comm.). The UDWR has collected least chub from the natural and introduced populations (an average of 528 per year combined for all populations for the last 17 years) to augment hatchery stocks or for transfer to new or existing introduced sites (UDWR 2014, entire). We are aware of no evidence that least chub are being illegally collected for commercial or recreational purposes.

Summary of Factor B

Least chub are not being overutilized for commercial, recreational, scientific, or educational purposes. Least chub that are needed for research purposes can be provided from fish hatchery stocks. A limited number of least chub are collected from wild populations for hatchery augmentation or for translocation purposes, but the available information does not indicate that this causes a threat to extant populations now or in the foreseeable future. We find that overutilization for commercial, recreational, scientific, or educational purposes is not a threat to the species now or likely to become so in the future.

Factor C. Disease or Predation

In our 2010 12-month finding (75 FR 35398), we concluded that nonnative fish predation of least chub was a threat to the continued existence of the species because least chub rarely persist where nonnative fishes are introduced (Osmundson 1985, p. 2; Hickman 1989, pp. 2–3, 9). The species is tolerant of broad natural habitat conditions and is well adapted to persist in the extreme, yet natural, environments of springs and playa marshes of the Bonneville Basin, but they are not an effective competitor with nonnative species (Lamarra 1981, p. 1) and are constantly at risk of the introduction and presence of nonnative fish (Hickman 1989, p. 10).

The mosquitofish is the most detrimental invasive fish to least chub (Perkins *et al.* 1998, p. 23; Mills *et al.* 2004b, entire). Mosquitofish prey on the eggs and smaller size classes of least chub and compete with adults and young (Mills *et al.* 2004b, p. 713). The presence of mosquitofish changes least chub behavior and habitat use because young least chub retreat to heavily vegetated, cooler habitats in an effort to seek cover from predation. In these less optimal environments, they have to compete with small mosquitofish that also are seeking refuge from adult mosquitofish. This predatory refuge scenario, in turn, affects survivorship and growth of least chub young-of-year (Mills *et al.* 2004b, pp. 716–717).

Mosquitofish tolerate an extensive range of environmental conditions and have high reproductive potential (Pyke 2008, pp. 171, 173). The ecological impact of introduced mosquitofish is well documented. Mosquitofish profoundly alter ecosystem function, and cause declines of native amphibians and small fish (Alcaraz and Garcia-Berthou 2007, pp. 83–84; Pyke 2008, pp. 180–181). The mosquitofish is native only to the southern United States and northern Mexico, but was introduced into more than 50 countries (García-Berthou *et al.* 2005, p. 453) to control mosquito populations (Pyke 2008, p. 172).

Mosquito abatement districts throughout Utah have released mosquitofish for mosquito control since 1931 (Radant 2002, p. 2), and the mosquitofish has expanded into aquatic ecosystems throughout Utah (Sigler and Sigler 1996, pp. 227–229). However, UDWR successfully persuaded the mosquito abatement districts in Utah to restrict stocking of mosquitofish for the protection of least chub through a signed MOU established in 2002 (Hines *et al.* 2008, p. 25). Despite this protective measure, mosquitofish are present in Mills Valley and Mona Springs. In the fall of 2013, several mosquitofish individuals were detected during annual sampling at Mills Valley. The likely source is overland sheet flow from the Sevier River during a recent flood event; however, they are not expected to be widespread yet (LCCT 2013c, entire), and UDWR will implement a population-wide assessment and removal effort in 2014. At Mona Springs, extensive chemical poisoning and mechanical efforts to remove mosquitofish were largely unsuccessful until recently. In 2013, least chub recruitment was documented at Mona Springs, following barrier installation and mosquitofish removal from isolated springheads (Grover and Crockett 2014, p. 2). These results are promising; however, long-term monitoring of this effort will be needed to determine if Mona Springs can successfully sustain least chub without further intervention. Despite the fact that mosquitofish are present at Mills Valley and Mona Springs, mosquitofish are not yet fully established at the Mills Valley site and the least chub population remains viable, and the mosquitofish removal and restoration efforts in 2013 at Mona Springs have shown positive results, suggesting that it may become a viable self-sustaining least chub population site in the near future, after several more years of successful least chub reproduction are documented.

Other nonnative fishes predate upon and compete with least chub when present in high enough densities. Rainwater killifish (*Lucania parva*) and plains killifish (*Fundulus zebrinus*) were illegally introduced into least chub habitats by unknown entities at an unknown time (Perkin *et al.* 1998, p. 23). These fish are potential competitors with the least chub because they are closely related to mosquitofish and have similar life histories and habitat requirements (Perkins *et al.* 1998, p. 23). Introduced game fishes, including largemouth bass (*Micropterus salmoides*), rainbow trout (*Oncorhynchus mykiss*), and brook trout (*Salvelinus fontinalis*), are predators of least chub, and these species are present in both native and introduced least chub habitats (Workman *et al.* 1979, pp. 1–2, 136; Osmundson 1985, p. 2; Sigler and Sigler 1987, p. 183; Crist 1990, p. 5). Common carp, in high densities, reduce submerged aquatic vegetation (Parkos *et al.* 2003, p. 187). Aquatic vegetation is preferred least chub-spawning habitat, and it provides the eggs, larvae, and young with oxygen, food, and cover (Crawford 1979, p. 74; Crist and Holden 1980, p. 808). As explained below, Clear Lake and Mills Valley least chub populations are currently sympatric with nonnative fishes.

Clear Lake is an expansive habitat that allows least chub to coexist with nonnative fishes. Common carp are present in Clear Lake (Hines *et al.* 2008, p. 43, Mellon 2011, p. 5), and UDWR has implemented carp removal efforts in Clear Lake, successfully reducing the carp densities, but efforts to fully extirpate carp are still ongoing (Wheeler 2011, pp. 1–2; UDWR 2013a, p. III–6).

The habitat in Mills Valley is a system of seasonally interconnected springs and wetlands that drain into the Sevier River (UDWR 2010, p. II–7). During spring flooding events least chub habitats are periodically connected to other habitat within the Mills Valley (UDWR 2006, p. 27). Nonnative green sunfish (*Lepomis cyanellus*), which is a voracious predator, and fathead minnow (*Pimephales promelas*) (Sigler and Sigler 1987, p. 306) invaded least chub habitat at the Mills Valley in 2005 (Hines *et al.* 2008, p. 43; UDWR 2006, pp. 36–37) and spread throughout the wetland complex by 2007 (UDWR 2010, p. II–7). Nonnative fish, as a percentage of the fish community in the area, declined annually from 64 percent in 2007, to less than 1 percent in 2009 (UDWR 2010, p. II–16), and although it is not clear why, it is possibly due to their use of shallower habitats that ice over in winter (least chub overwinter in deeper habitats) that provide unsuitable habitat conditions for them in some years (UDWR 2013a, p. II–8). Thus, the severity of this threat appears to be minimal at this time, based on the best available information.

Although nonnative fish numbers in least chub habitat declined from 2007 to 2009 (UDWR 2010, p. II–16), the potential for nonnative reinvasion during unusually high spring flooding events continues to impact the Mills Valley least chub population. In light of this, the 2014 CCA amendment requires the drafting of a nonnative fish management plan by the spring of 2015, to address nonnative fish presence and removal efforts at both Mills Valley and Mona Springs least chub populations.

Overall, nonnative fish occur at three of the six naturally occurring least chub populations (Clear Lake WMA, Mills Valley, and Mona Springs). Mosquitofish are only present at two of the six naturally occurring sites: Mills Valley and Mona Springs. Efforts are ongoing to reduce the impacts of nonnative species at the naturally occurring least chub sites, and we are seeing recent successes. However, if nonnative species persist and continue to negatively impact the naturally occurring sites, the recent successful establishment of introduced least chub populations helps to mediate any concerns for the species because the introduced least chub populations are not negatively affected by nonnative species, as described below.

Nonnative species are present in only 2 of the 10 introduced least chub populations (Fitzgerald WMA and Rosebud Top Pond; see Table 1, above). The introduced population criteria specifically require that for any introduction to become successful, no nonnatives be present or present only in low numbers and of species types that do not impact least chub. Mosquitofish are not present in any of the 10 introduced populations. The populations have remained stable at the two sites where nonnative fishes co-exist, in low numbers, with least chub. Based on the successful establishment of the introduced sites, nonnative species are not considered a threat to these populations. By including these 10 introduced populations in conjunction with the naturally occurring populations, the overall threat to the species is reduced because these populations allow us to mitigate the potential that some least chub sites may become unable to support the species over time due to nonnative fish predation pressures. By protecting a variety of habitats and establishing introduced populations throughout the species' historical range, we increase the probability that the species can adjust in the future to various limiting factors that may affect the population.

Disease and parasitism have not affected least chub to a significant degree. Although the parasite blackspot (*Neascus cuticola*) was present at the Leland Harris Spring Complex site during 1977–78, all least chub were robust and in good condition (Workman *et al.* 1979, pp. 2, 103–107). More recently, the parasite was identified in least chub at the Bishop Springs site (Wheeler *et al.* 2004, p. 5). Although we have no information that allows us to determine the effect of blackspot on least chub at the Bishop Springs site, the population has remained stable for the past 15 years (Hines *et al.* 2008, pp. 37–39, Peterson and Saenz, p. 69). As described in our 2010 12-month finding, parasites exist in least chub habitats and some least chub are known to harbor parasites, but we do not have scientific information that the presence of parasites pose a threat to individual least chub or least chub populations. At this time, the best available information does not indicate that the presence of parasites or disease poses a threat to the least chub now nor is likely to in the future.

Summary of Factor C

Least chub are unlikely to persist in the presence of mosquitofish without human intervention. Mosquitofish prey upon least chub eggs and young and compete with least chub for food items, which can result in the decline and eventual elimination of least chub populations. Mosquitofish have already caused the extirpation of several least chub populations. The stocking of mosquitofish into least chub habitat by State mosquito abatement programs is addressed by an MOU that regulates this practice. However, removing mosquitofish from aquatic habitats has only recently proven successful, and they continue to invade new sites on a limited basis. Disease and parasites are not known to pose a threat to least chub populations.

Overall, we have determined that two of the six least chub naturally occurring populations (Mona Springs and possibly Mills Valley, if mosquitofish successfully establish) are impacted by the presence of nonnative fish species, which are currently being addressed through the 2014 CCA amendment conservation actions. However, establishment of the 10 introduced populations mitigates the potential that some least chub sites may become unable to support the species at some point in the future due to nonnative fish predation pressures. Based on the best scientific and commercial information available to us, we conclude that nonnative fish predation of least chub is not a threat to the least chub now nor is likely to become so in the future.

Factor D. Inadequacy of Existing Regulatory Mechanisms

In our 2010 12-month finding (75 FR 35398), we concluded that the existing regulatory mechanisms related specifically to land management were sufficient for mitigating potential threats to least chub, but regulatory mechanisms were not in place to adequately protect the species from groundwater withdrawal. We now find that regulatory mechanisms related specifically to water management are sufficient for mitigating potential threats to the least chub. The LCCT (comprised of various agencies that implement conservation actions for least chub) has successfully worked with the partners to establish protective mechanisms on most of the existing natural and introduced populations of least chub, including land acquisitions, easements, instream flows, and establishment of an ACEC that precludes oil and gas development. Furthermore, the changes to the SNWA GWD Project and the 2014 CCA amendment that adds conservation actions to address Snake Valley groundwater development addresses threats to the species.

Regulatory mechanisms affecting the species fall into three general categories: (1) Land and water management; (2) State mechanisms; and (3) Federal mechanisms.

Land and Water Management

Land Management—Populations of least chub are distributed across private, BLM, SITLA, Mitigation Commission, and UDWR lands, and are protected by varying regulatory mechanisms depending on land ownership. The percentages of managed lands and those under landowner or other protective agreements are shown in Table 3, below, and the details of each natural population are further described in our 2010 12-month finding (75 FR 35398). The introduced populations are described in the 2014 CCA amendment (LCCT 2014, entire; UDWR 2013b, entire). Table 3 shows that 82 percent of all populations have the majority (67 percent to 100 percent) of their habitat either managed specifically for least chub by State or Federal agencies or managed for least chub by agreements, and that 12 of 16 populations have 100 percent of their habitat either managed by State or Federal agencies or managed by agreements with private landowners.

Water Management—Populations of least chub are distributed across a suite of groundwater basins with various levels of groundwater policies and regulations by UDWRi (i.e., open, closed, or restricted), with varying associated protections (see the ''Current Groundwater Policy and Management'' section, above). Each groundwater basin status by site is described above under Factor A, with 25 percent of natural and introduced least chub populations occurring in closed basins, 25 percent occurring in restricted basins, and 50 percent occurring in open basins. Of these, 80 percent of all the populations have water rights providing water available at the site for least chub (held by various entities, including BLM, UDWR, Utah State Parks, local government, Department of Defense, and private landowners), regardless of their groundwater basin status, thus providing stable water sources for the least chub populations at these sites. Populations of least chub without water rights either occur in closed basins (Mona Springs, Mills Valley), or are located in a basin that monitors groundwater levels (i.e., Leland Harris in Snake Valley monitored by UGS wells). Upon closure of a basin, no additional appropriations can be issued by the Utah State Engineer per the statutory requirements set forth under Utah Code (title 73, chapter 3, sections 1 and 8; and title 73, chapter 4, section 1); thus, basin closures provide regulatory protection from additional groundwater withdrawals. Overall, 94 percent of the populations have regulatory mechanisms that secure water for the site (water rights) or protect against additional withdrawals as enforced by UDWRi (closed basin status). Thus, we find that the existing regulatory mechanisms are adequate to protect the species from threats due to groundwater withdrawals.

TABLE 3—LAND OWNERSHIP AND PERCENT OF NATURAL AND INTRODUCED LEAST CHUB HABITAT MANAGED BY STATE OR FEDERAL AGENCIES, MANAGED UNDER AN AGREEMENT, OR NOT MANAGED, BY SITE

Site	Land ownership	Percent occupied habitat		
		Managed by state or federal agencies	Managed under agreements	Not managed
Mona Springs	Mitigation Commission	100		
Mills Valley	UDWR, private	20		80
Clear Lake WMA	UDWR	100		
Leland Harris Complex	BLM, private, UDWR	33	67	
Gandy Marsh	BLM, SITLA, private	80	[1] 19	1
Bishop Springs	BLM, private, SITLA	47		[2] 53
Fitzgerald WMA	UDWR	100		
Rosebud Top Pond	Private		100	
Cluster Springs	BLM	100		
Pilot Spring SE	BLM	100		
Escalante Elementary	Local Govt		100	
Upper Garden Creek	State Parks	100		
Deseret Depot	Dept. of Defense		100	
Red Knolls Pond	BLM	100		
Keg Spring	BLM	100		
Pilot Spring	BLM	100		

[1] Under voluntary, informal agreement between landowner and UDWR.
[2] 100 percent of springs are fenced from grazing per agreements with SITLA, but lands are not actively managed by SITLA.

(2) State Regulatory Mechanisms

Least chub are considered ''prohibited'' species under the Utah Collection Importation and Possession of Zoological Animals Rule (Utah Code 657–3), making them unlawful to collect or possess. Thus, the species receives regulatory protection from unauthorized collection and take. While its classification is not a regulatory mechanism, the least chub is classified in the State of Utah Wildlife Action Plan as a Tier 1 Sensitive Species, a status that includes federally listed species and species for which a conservation agreement was completed and implemented (Bailey *et al.* 2005, p. 3).

Introduced nonnative fishes for mosquito abatement and game-fishing purposes can be detrimental to the persistence of least chub (see Factor C discussion). The primary mode of historical mosquitofish introduction into least chub habitats was through the actions of Utah's Mosquito Abatement Districts, which used mosquitofish for vector control (Radant 2002, entire; see Factor C for detailed discussion). Under the authority of 657–16 of the Utah Code, the 2003 Policy for Fish Stocking and Transfer Procedures does not allow stocking of nonnative fishes, including mosquitofish, into aquatic habitats without appropriate documentation and certification. This Statewide policy specifies protocols for the introduction of nonnative species into Utah waters and states that all stocking actions must be consistent with ongoing recovery and conservation actions for State of Utah sensitive species, including least chub. This policy is not expected to change in the future. Thus, this policy provides adequate regulation in the prevention of the primary mode of mosquitofish introduction in least chub sites.

The State of Utah operates under the 2008 Utah Aquatic Invasive Species Interdiction Act (Aquatic Invasive Species Act), per title 23, chapter 27 of the Utah Code (and Rule 657–60), which was developed to prevent the movement of aquatic invasive species, including quagga mussels (*Dreissena* sp.), zebra mussels (*Dreissena* sp.), and mud snails (*Potamopyrgus* sp.) during fish transfer operations (UDWR 2009a, entire). Under the Aquatic Invasive Species Act, a control plan is required by UDWR and must include notification and evaluation of water sources being considered for fish transfers, fish health inspections, and completion of an updated hazard analysis and critical control point plan. The Aquatic Invasive Species Act should help reduce the probability of additional aquatic invasive species introductions to least chub habitats.

Regulatory mechanisms that relate to historical groundwater withdrawal are implemented through the USE through the UDWRi, as described in Factor A, ''Water Withdrawal and Diversion'' section, and the Factor D, ''Land and Water Management'' section, above. Groundwater withdrawal in the Snake Valley for future municipal development by SNWA or other potentially interested parties is subject to both Federal and State regulatory processes (Lincoln County Conservation Recreation and Development Act (LCCRDA) and Utah Code 73–3, 73–4, respectively). Therefore, we find that the State regulatory mechanisms in existence adequately protect the least chub from the threat of reduction of habitat.

(3) Federal Regulatory Mechanisms

The major Federal regulatory mechanisms for protection of least chub and its habitat are through section 404 of the Clean Water Act (33 U.S.C. 1251 *et seq.*), the stipulated agreement for Spring Valley, Federal Land Policy and Management Act (43 U.S.C. 1701 et seq.) (FLPMA), and the National Environmental Policy Act (42 U.S.C. 4231 et seq.) (NEPA). Additionally, various Executive Orders (E.O. 11990 for wetlands, E.O. 11988 for floodplains, and E.O. 13112 for invasive species) provide guidance and incentives for Federal land management agencies to manage for habitat characteristics essential for least chub conservation.

Least chub population areas contain wetland habitats, and section 404 of the Clean Water Act regulates fill in wetlands that meet certain jurisdictional requirements. Activities that result in fill of jurisdictional wetland habitat require a section 404 permit. We can review permit applications and provide recommendations to avoid and minimize impacts and implement conservation measures for fish and wildlife resources, including the least chub. However, incorporation of Service recommendations into section 404 permits is at the discretion of the U.S. Army Corps of Engineers. In addition, not all activities in wetlands involve fill and not all wetlands are ''jurisdictional.'' Regardless, we have evaluated threats to the species' habitat where fill of wetlands may occur, including peat mining and oil and gas development. At this time we do not have information to indicate that peat mining and oil and gas development pose a threat to the species.

As described under Factor A, SNWA and DOI agencies entered into the Spring Valley Stipulated Agreement in 2007. The Spring Valley Stipulated Agreement requires hydrological and biological monitoring, and management and mitigation of unreasonable adverse effects to federal resources from SNWA groundwater pumping in Spring Valley (NSE 2007, entire). For reasons cited previously, we are confident that the changes the SNWA GWD Project (which now excludes Snake Valley), UGS monitoring, and the 2014 CCA amendment conservation actions will be effective in protecting least chub habitat in Snake Valley.

The Federal Land Policy and Management Act (FLPMA) is the primary Federal law governing most land uses on BLM-administered lands across the range of the least chub populations. Section 102(a)(8) of FLPMA specifically recognizes wildlife and fish resources as being among the uses for which these lands are to be managed. Regulations pursuant to FLPMA address wildlife habitat protection on BLM administered land. Cumulatively, BLM regulations allow the agency to formally recognize sensitive species for special management and protection and include them as such in their land management plans. The least chub is designated as a sensitive species by the BLM in Utah. The policy in BLM Manual 6840—Special Status Species Management (BLM Manual 6840) states: ''Consistent with the principles of multiple use and in compliance with existing laws, the BLM shall designate sensitive species and implement species management plans to conserve these species and their habitats and shall ensure that discretionary actions authorized, funded, or carried out by the BLM would not result in significant decreases in the overall range-wide species population and their habitats'' (BLM 2008, p. 10). Similarly, the BLM Manual 1613—Areas of Critical Environmental Concern (ACEC) (BLM Manual 1613) allows designation of critical areas for the protection of fish and wildlife resources and natural processes and systems (BLM 1988, entire). Designation of Gandy Marsh as an ACEC closed the area to oil and gas leasing by BLM in accordance with the House Resource Management Plan (RMP) and provides additional protection for least chub beyond that provided by the RMP (BLM 1987, entire; BLM 1993, entire). The RMP is BLM's land use decision-making document that provides guidance on management decisions for the area, including issuance of grazing permits and oil and gas leasing. The RMP specific to the Snake Valley populations is expected to be updated in approximately 10 to 15 years. Any change to the management direction would be reviewed at the time of the update and subject to public comment (BLM 2009a, p. 54).

The BLM manual 6840 also establishes management policy and direction for BLM's continued involvement in the 2014 CCA amendment and its membership on the LCCT (LCCT 2014, entire). Furthermore, the BLM, through the 2014 CCA amendment, has committed to the continued management and protection of least chub and its habitat on BLM lands (LCCT 2014, p. 18, 19). Although CCAs are not regulatory mechanisms, CCA signatories can implement conservation measures via regulatory mechanisms, and the BLM has used its regulatory authority to implement the specific protections for the least chub as outlined in the 2014 CCA amendment through its ACEC designation and grazing management under the RMP (as described above).

As required through NEPA for federal actions, the BLM published a ROD authorizing SNWA groundwater conveyance across BLM lands in Delamar, Dry Lake, Cave, and Spring valleys in Nevada, but not Snake Valley (as described under Factor A). Thus, the SNWA GWD Project is not currently authorized to develop groundwater from the Snake Valley.

NEPA also has a provision for the Service to assume a cooperating agency role for Federal projects undergoing evaluation for significant impacts to the human environment. This includes participating in updates to BLM's RMPs. As a cooperating agency, we have the opportunity to provide recommendations to the action agency to avoid impacts or enhance conservation for least chub and its habitat. For projects where we are not a cooperating agency, we often review proposed actions and provide recommendations to minimize and mitigate impacts to fish and wildlife resources.

Acceptance of our NEPA recommendations is at the discretion of the action agency. The BLM land management practices are intended to ensure avoidance of negative effects to species whenever possible, while also providing for multiple-use mandates; therefore, maintaining or enhancing least chub habitat may be considered in conjunction with other agency priorities.

Summary of Factor D

We find that regulatory mechanisms related specifically to land management are sufficient for mitigating potential impacts from land development to the least chub. BLM has provided protective mechanisms in the form of an ACEC at Gandy Marsh. We also retain the ability to comment on NEPA evaluations for other projects on BLM lands that may impact the least chub.

The Spring Valley Stipulated Agreement, the lack of trans-basin transfer of water resources without an interstate agreement (per LCCRDA), the closure of groundwater basins in Utah (Utah Code 73–3, 73–4), and the exclusion of Snake Valley from the SNWA GWD Project (via BLM's ROD) are adequate to sufficiently protect the least chub from local or large-scale groundwater withdrawal.

As evidenced by the discussion above, the species is adequately protected by the existing regulatory mechanisms; thus, we conclude that the lack of existing regulatory mechanisms is not a threat to the species, now or in the future.

Factor E. Other Natural or Manmade Factors Affecting Its Continued Existence

Our 2010 12-month finding (75 FR 35398) found that natural and manmade threats to the species included: (1) Drought and climate change; and (2) cumulative effects of drought, climate change, and groundwater withdrawal.

Our 2010 12-month finding also concluded that hybridization, loss of genetic diversity, and stochastic disturbance and population isolation were not considered a threat to the least chub. We have no information to indicate that those conclusions of our 2010 12-month finding should change. While introduced populations were not evaluated under these factors in that 12-month finding, the introduced populations only serve to enhance the resiliency and redundancy for the species should something unanticipated happen to the natural populations. Therefore, we conclude again that hybridization, loss of genetic diversity, and stochastic disturbance and population isolation are not a threat to the species.

Climate Change

Our analyses under the Act include consideration of environmental changes resulting from ongoing and projected changes in climate. The terms ''climate'' and ''climate change'' are defined by the Intergovernmental Panel on Climate Change (IPCC). The term ''climate'' refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (IPCC 2007a, p. 78). The term ''climate change'' thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007a, p. 78).

Scientific measurements spanning several decades demonstrate that changes in climate are occurring, and that the rate of change has been faster since the 1950s. Based on extensive analyses of global average surface air temperature, the most widely used measure of change, the IPCC concluded that warming of the global climate system over the past several decades is ''unequivocal'' (IPCC 2007a, p. 2). In other words, the IPCC concluded that there is no question that the world's climate system is warming.

Examples of other changes include substantial increases in precipitation in some regions of the world and decreases in other regions (for these and additional examples, see IPCC 2007a, p. 30; Solomon *et al.* 2007, pp. 35–54, 82–85). Various environmental changes (e.g., shifts in the ranges of plant and animal species, increasing ground instability in permafrost regions, conditions more favorable to the spread of invasive species and of some diseases, changes in amount and timing of water availability) are occurring in association with changes in climate (IPCC 2007a, pp. 2–4, 30–33).

Results of scientific analyses presented by the IPCC show that most of the observed increase in global average temperature since the mid-20th century cannot be explained by natural variability in climate and is ''very likely'' (defined by the IPCC as 90 percent or higher probability) due to the observed increase in greenhouse gas (GHG) concentrations in the atmosphere as a result of human activities, particularly carbon dioxide emissions from fossil fuel use (IPCC 2007a, pp. 5–6 and figures SPM.3 and SPM.4; Solomon *et al.* 2007, pp. 21–35). Further confirmation of the role of GHGs comes from analyses by Huber and Knutti (2011, p. 4), who concluded it is extremely likely that approximately 75 percent of global warming since 1950 has been caused by human activities.

Scientists use a variety of climate models, which include consideration of natural processes and variability, as well as various scenarios of potential levels and timing of GHG emissions, to evaluate the causes of changes already observed and to project future changes in temperature and other climate conditions (e.g., Meehl *et al.* 2007, entire; Ganguly *et al.* 2009, pp. 11555, 15558; Prinn *et al.* 2011, pp. 527, 529). All combinations of models and emissions scenarios yield very similar projections of average global warming until about 2030. Although projections of the magnitude and rate of warming differ after about 2030, the overall trajectory of all the projections is one of increased global warming through the end of this century, even for projections based on scenarios that assume that GHG emissions will stabilize or decline. Thus, there is strong scientific support for projections that warming will continue through the 21st century, and that the magnitude and rate of change will be influenced substantially by the extent of GHG emissions (IPCC 2007a, pp. 44–45; Meehl *et al.* 2007, pp. 760–764; Ganguly *et al.* 2009, pp. 15555–15558; Prinn *et al.* 2011, pp. 527, 529).

In addition to basing their projections on scientific analyses, the IPCC reports projections using a framework for treatment of uncertainties (e.g., they define ''very likely'' to mean greater than 90 percent probability, and ''likely'' to mean greater than 66 percent probability; see Solomon *et al.* 2007, pp. 22–23). Some of the IPCC's key projections of global climate and its related effects include: (1) It is virtually certain there will be warmer and more frequent hot days and nights over most of the earth's land areas; (2) it is very likely there will be increased frequency of warm spells and heat waves over most land areas; (3) it is very likely that the frequency of heavy precipitation events, or the proportion of total rainfall from heavy falls, will increase over most areas; and (4) it is likely the area affected by droughts will increase, that intense tropical cyclone activity will increase, and that there will be increased incidence of extreme high sea level (IPCC 2007b, p. 8, Table SPM.2). More recently, the IPCC published additional information that provides further insight into observed changes since 1950, as well as projections of extreme climate events at global and broad regional scales for the middle and end of this century (IPCC 2011, entire).

Various changes in climate may have direct or indirect effects on species. These may be positive, neutral, or negative, and they may change over time, depending on the species and other relevant considerations, such as interactions of climate with other variables such as habitat fragmentation (for examples, see Franco *et al.* 2006; IPCC 2007b, pp. 8–14, 18–19; Forister *et al.* 2010; Galbraith *et al.* 2010; Chen *et al.* 2011). In addition to considering individual species, scientists are evaluating possible climate change-related impacts to, and responses of, ecological systems, habitat conditions, and groups of species; these studies include acknowledgement of uncertainty (e.g., Deutsch *et al.* 2008; Berg *et al.* 2009; Euskirchen *et al.* 2009; McKechnie and Wolf 2009; Sinervo *et al.* 2010; Beaumont *et al.* 2011; McKelvey *et al.* 2011; Rogers and Schindler 2011).

Many analyses involve elements that are common to climate change vulnerability assessments. In relation to climate change, vulnerability refers to the degree to which a species (or system) is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the type, magnitude, and rate of climate change and variation to which a species is exposed, its sensitivity, and its adaptive capacity (IPCC 2007a, p. 89; see also Glick *et al.* 2011, pp. 19–22). No single method for conducting such analyses applies to all situations (Glick *et al.* 2011, p. 3). We use our expert judgment and appropriate analytical approaches to weigh relevant information, including uncertainty, in our consideration of various aspects of climate change.

As is the case with all stressors that we assess, even if we conclude that a species is currently affected or is likely to be affected in a negative way by one or more climate-related impacts, it does not necessarily follow that the species meets the definition of an ''endangered species'' or a ''threatened species'' under the Act. If a species is listed as endangered or threatened, knowledge regarding the vulnerability of the species to, and known or anticipated impacts from, climate-associated changes in environmental conditions can be used to help devise appropriate strategies for its recovery.

The IPCC predicts that the resiliency of many ecosystems is likely to be exceeded this century by an unprecedented combination of climate change, associated disturbances (e.g., flooding, drought, wildfire, and insects), and other global drivers (IPCC 2007, pp. 31–33). With medium confidence, IPCC predicts that approximately 20 to 30 percent of plant and animal species assessed by the IPCC so far are likely to be at an increased risk of extinction if increases in global average temperature exceed 1.5 to 2.5 °C (3 to 5 °F) (IPCC 2007a, p. 48).

Utah is projected to warm more than the average for the entire globe (Governor's Blue Ribbon Advisory Council on Climate Change (GBRAC) 2008, p. 14). The expected consequences of this warming are fewer frost days, longer growing seasons, and more heat waves (GBRAC 2008, p. 14). For Utah, the projected increase in annual mean temperature by year 2100 is about 4.5 °C (8 °F) (GBRAC 2008, p. 14). Because of increased temperature, Utah soils are expected to dry more rapidly (GBRAC 2008, p. 20), and this is likely to result in reduced inundation duration and depth in least chub habitat during certain years. Utah is also projected to have more frequent heavy precipitation events, separated by longer dry spells as a result of climate change (GBRAC 2008, p. 15). Drought is a localized dry spell. Drought conditions are a potential stressor to the least chub, as rainfall determines springhead discharge and wetland inundation, which may indirectly control population size in the isolated habitat of the individual wetland/spring complexes in which least chub reside.

Precipitation models predict a reduction in mountain snowpack, a threat of severe and prolonged episodic drought (UBRAC 2007, p. 3), and a decline in summer precipitation across all of Utah (UBRAC 2007, p. 18). However, Utah is in the transition zone for predicted changes in winter precipitation (between the northwest and southwest United States), resulting in low confidence in future winter precipitation trends (UBRAC 2007, p 18).

More locally to least chub, the hydrology of the Great Salt Lake Basin will be impacted by changes in mountain runoff (UBRAC 2007, p. 18). While predictions indicate that the Great Salt Lake Basin will be affected by declining mountain snowpack and the resulting runoff, the timing and extent of these changes are unclear (UBRAC 2007, p. 19). Drought conditions and higher evaporation rates could likely result in lowered groundwater levels, reduced spring flows, and reductions in size and depth of pool habitat for least chub (Wilson 2006, p. 8).

Because the least chub depends on small, ephemeral springfed wetlands for major portions of its life history (spawning, nursery niches, and feeding) and the amount of this habitat available will likely be reduced and restricted to spring heads, the severity of climate change is an important factor in the species' persistence. Under circumstances of restricted habitats, both hybridization and extirpation have occurred (Hubbs 1955, p. 18; Miller and Behnke 1985, p. 514). Additionally, the species is bound by dispersal barriers throughout its range and cannot retreat to additional habitats or easily recolonize areas after they are extirpated.

Least chub survival and reproduction, as described above, are highly dependent upon habitat inundation, which in turn is dependent upon climatic conditions (precipitation and temperature). Climate change is predicted to increase temperatures and increase the likelihood and duration of drought conditions in Utah. Both of these effects will reduce inundation depths and amount of wetted habitat and could impact the least chub. Despite the predicted effects of climate change on least chub and its habitat, there are several factors that offset the effects of climate change and must be weighed against potential effects including habitat restoration, established water rights, and the redundancy of multiple populations. To help the species adapt and be resilient to changing climates, the 2014 CCA amendment commits to maintaining habitat corridors between the springs and wetlands through habitat modification or restoration activities, if warming periods close off these important corridors. This scenario is expected to result in greater habitat connectivity under these circumstances and make the species more resilient to climate change.

The species' resiliency has also been increased by the increased number of introduced populations (increased redundancy) that now reside across a significant portion of the northern Bonneville Basin. As detailed in the sections above, there are an additional 10 introduced least chub populations that were not included in the 2010 12-month finding analysis. Even though several of these populations were in existence at the time, they were not included because information was limited and their long-term success was unknown. These populations are spread over an area that is likely to have more diverse microclimates, resulting in a greater variability and ability for the species to adapt to changing climatic conditions than was originally considered in our 2010 12-month finding. Thus, these additional areas and their individual micro climates will increase species' resiliency and decrease its vulnerability to the effects of climate change.

Since our 2010 12-month finding, the LCCT has secured water rights at least chub population locations, which has further increased the resiliency of the species and decreased its susceptibility to the effects of climate change. As explained in the ''Water Withdrawal and Diversion'' section above, 3 of the 6 natural populations and all of the 10 introduced populations have secure water rights. Although water rights are typically subject to changes in yearly runoff or precipitation amounts, they are nonetheless regulated by the USE and provide assurance of a continued water source for least chub habitats.

In summary, least chub habitats are isolated from each other and are thus limited in adapting to changing climatic conditions by shifting habitat use (e.g., move into spring head habitat), but the expanded geographic range when considering the introduced populations now encompasses the western half of Utah in the Bonneville Basin, thereby counteracting the effects of climate change as climatic effects will vary across this 28-million-acre range. In addition, proven successes of habitat restoration will allow the LCCT to employ an adaptive management process that allows for isolated or dewatered areas to be recovered for functional least chub habitat. Established water rights for a majority of natural and introduced least chub sites will result in greater protection of species habitat. For these reasons, we conclude that environmental changes resulting from climate change, including drought, will be moderated as a result of range expansion through previous and anticipated conservation actions in the 2014 CCA amendment, established water rights, and broadly distributed population, and therefore, we do not consider climate change to be a threat to the species.

Summary of Factor E

Least chub have persisted for thousands of years, and naturally occurring drought does not pose a threat to the species. Climate models predict that Utah may warm more than average, with more heat waves, less mountain snowpack, and a decline in summer precipitation. The introduced sites occur over a large geographic range and provide habitat heterogeneity and redundancy, they are supported by established water rights, and habitat restoration can be used to offset some effects of climate change. We believe that this approach provides a buffer against environmental effects that may result from cumulative effects of drought and changing climate conditions in the Bonneville Basin, and we conclude that addressing the threats identified in the 2010 12-month finding will prevent these threats from acting cumulatively.

Cumulative Effects

We cannot completely predict the cumulative effects of climate change and drought on least chub at this time, but we know that each will occur to some extent and be compounded by the others. In our 2010 12-month finding (75 FR 35398), the cumulative effects of proposed large-scale groundwater withdrawal, drought, and climate change were likely to pose a threat to the least chub. However, as described above, because of the changes in the SNWA GWD Project, the addition of UGS monitoring, and 2014 CCA amendment conservation actions, water development is no longer a threat to least chub, and the effects of drought and climate change are mitigated by the presence of the introduced least chub populations across a large geographic range.

In summary, we find that the potential combination of drought and climate change are likely to occur but that the expanded geographic range of all the populations together, when including the introduced sites, thereby counteract the effects of climate change as effects will vary across the full range of the species, and established water rights for the majority of the natural and introduced populations will offset any significant effects. Since the impacts of each of the cumulative threats are reduced, these threats cumulatively no longer are a threat to the species.

Finding

As required by the Act, we considered the five factors in assessing whether the least chub meets the definition of an endangered or threatened species. We examined the best scientific and commercial information available regarding the past, present, and future threats faced by the species. Based on our review of the best available scientific and commercial information, we find that the current and future threats are not of sufficient imminence, intensity, or magnitude to indicate that the least chub is in danger of extinction (endangered), or likely to become endangered within the foreseeable future (threatened). Therefore, the least chub does not meet the definition of an endangered or a threatened species, and we are withdrawing the least chub from our candidate list. Our rationale for this finding is outlined below.

Review of least chub historical population trends shows that the distribution of the least chub was reduced from its historical range in Utah's Bonneville Basin. However, UDWR surveys in the 1990s and 2000s discovered 3 new populations on the eastern extent of the historical range, and 10 successful introduced populations have been established since 2005. We now consider 15 viable, naturally occurring and introduced least chub populations to exist (excluding Mona Springs due to lack of a self-sustaining population at this current time).

The least chub is not in danger of extinction because 10 successful introduced populations have been established in addition to the naturally occurring populations, and these populations, when combined, show high likelihood of persistence even under higher probabilities of catastrophic events, as analyzed by the initial PVA (Peterson and Seanz 2013, p. 30). The introduced sites occur over a large geographic range and provide habitat heterogeneity and redundancy. We conclude that they provide a buffer against environmental effects that may result from cumulative effects of drought and changing climate conditions in the Bonneville Basin. Furthermore, their distribution encompasses and is representative of the known genetic diversity of the species (each natural population and GMU is represented in at least one introduced population). If the species continued to persist in its current distribution, we conclude that it will have sufficient resiliency, redundancy, and representation to persist now and in the foreseeable future.

In our 2010 12-month finding (75 FR 35398), we identified several threats that we expected to significantly impact the status of the species as a whole into the foreseeable future, which was an appropriate conclusion based on the best available scientific and commercial information available at that time. However, since that time, activities such as the SNWA GWD Project have been modified substantially, and significant ongoing and new conservation efforts have reduced the magnitude of potential impacts in the future such that the species no longer meets the definition of an endangered or threatened species.

In our 2010 12-month finding, we identified livestock grazing, groundwater development and withdrawal, lack of regulatory mechanisms to regulate groundwater withdrawal, nonnative fishes, and the effects of climate change and drought (and their cumulative effects) as threats to the continued existence of the least chub. Our conclusion was based on information about past and current impacts to least chub habitat due to these stressors, information about continued and future groundwater development near least chub habitat, and the lack of a sufficient number of populations to protect against these stressors.

Since the time of our 2010 12-month finding, the LCCT has made a significant effort to develop and implement additional conservation measures (2014 CCA amendment) for the least chub. The 2005 CCA contained conservation measures that were implemented by the BLM and UDWR that have reduced or eliminated threats to the least chub, including fencing projects and private landowner agreements (see Previous and Ongoing Conservation Efforts and Future Conservation Efforts sections, above). In addition, through the 2014 CCA amendment, the LCCT has implemented several conservation measures that address the threat of livestock grazing by acquiring and managing lands for the protection of least chub (land-swap and grazing rights purchase), committing to habitat restoration activities, and fencing heavily impacted areas. The LCCT has also committed to nonnative fish removal by implementing activities, now described in the 2010 Nonnative Fish Management Plans, which have been successful at Clear Lake and recently at Mona Springs. Furthermore, groundwater withdrawal in the Snake Valley is being closely monitored through the UGS monitoring well network and through a bathymetry and habitat evaluation of Leland Harris; once completed, this network will provide us with the ability to track the projections we make in this document regarding the effects of groundwater withdrawals. Restoration and habitat modifications have ensured adequate habitat corridors for dispersal and colonization within population sites, which is expected to increase resilience to future random natural impacts and offset the threat of climate change and drought. In addition, water rights at half of the natural and all of the introduced least chub sites (held by a variety of entities, including UDWR, BLM, local government, Department of Defense, and private landowners) will help offset the effects of climate change and drought by providing dedicated water sources to help stabilize area water levels and ensure adequate habitat is available.

As summarized in the Previous and Ongoing Conservation Efforts, Future Conservation Efforts, and PECE Analysis sections above, we have a high degree of certainty that the 2005 CCA and the 2014 CCA amendment will continue to be implemented. See Table 2 under Future Conservation Efforts for the status of the 2014 CCA amendment conservation actions. Our level of certainty is high because: (1) The signatory agencies have been compliant with implementation of the conservation actions of the original 1998 CCA and its 2005 reauthorization; (2) the authorities for expending funds are in place and least chub research and population monitoring has been funded by signatory agencies for the last 20+ years; (3) signatory agencies have been responsive to protecting existing habitat and acquiring new introduction sites for the species; (4) monitoring and documentation of compliance with the conservation measures are in place; (5) annual reports of monitoring have been completed; (6) adaptive management will be used to reassess conservation actions on a regular basis; (7) water rights are established for the majority of least chub locations—all of these least chub sites have sufficient natural water flow to maintain populations, but the water rights provide additional security (above and beyond natural flows) in the event that water levels decrease at some point in the future; and (8) all parties have the legal authorities to carry out their responsibilities under the 2005 CCA and the 2014 CCA amendment. In addition, the estimated occupancy rates and the presence of recruitment have remained consistent over the last 10 years.

We also have high certainty that the suite of conservation measures in the 2005 CCA and the 2014 CCA amendment will be effective at reducing and eliminating threats to the least chub to the point that the species does not meet the definition of an endangered or threatened species. Our certainty arises from the fact that the 10 successful introduced populations have been established, and the CCAs have been successful in implementing conservation actions in the past. Furthermore, annual monitoring and reporting requirements will ensure that all of the conservation measures are implemented as planned, and are effective at removing threats to the least chub and its habitat. Any issues that arise will be discussed at annual meetings and the adaptive management process will be used to address any identified issues until they are resolved. The collaboration between us and other stakeholders requires regular meetings and mandatory involvement of all signatories and associated parties in order to implement the agreement fully, as outlined in the 2014 CCA amendment.

In summary, we conclude that the conservation efforts have sufficient certainty of implementation and effectiveness that they can be relied upon in this 12-month finding. Further, we conclude that conservation efforts have reduced or eliminated current and future threats to the least chub to the point that the species is not in danger of extinction now or in the foreseeable future. In addition, we received new information that several of the threats identified in our 2010 12-month finding (75 FR 35398) do not reduce the viability of the species to the level that it meets the definition of an endangered or threatened species under the Act. Therefore, we find that listing the least chub as endangered or threatened is not warranted.

We will continue to monitor the status of the species through monitoring requirements in the 2005 CCA and 2014 CCA amendment, and our evaluation of any other information we receive. These monitoring requirements will not only inform us of the amount of least chub habitat protected through the actions, but will also help inform us of the status of the least chub natural and introduced populations. Additional information will continue to be accepted on all aspects of the species. We encourage interested parties, outside of those parties already signatories to the 2005 CCA and the 2014 CCA amendment, to become involved in the conservation of the species.

If at any time data indicate that protective status under the Act should be needed, for example, we become aware of declining enforcement of or participation in the CCA or CCA amendment or noncompliance with the conservation actions, or if there are new threats or increasing stressors that rise to the level of a threat, we can initiate listing procedures, including, if appropriate, emergency listing pursuant to section 4(b)(7) of the Act.

Distinct Population Segment Analysis

After assessing whether the species is endangered or threatened throughout its range, we considered whether a distinct vertebrate population segment (DPS) of the least chub meets the definition of an endangered or threatened species.

Under the Service's Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act (61 FR 4722, February 7, 1996), three elements are considered in the decision concerning the establishment and classification of a possible DPS. These are applied similarly for additions to or removal from the Federal List of Endangered and Threatened Wildlife. These elements include:

(1) The discreteness of a population in relation to the remainder of the species to which it belongs;

(2) The significance of the population segment to the species to which it belongs; and

(3) The population segment's conservation status in relation to the Act's standards for listing, delisting, or reclassification (i.e., is the population segment endangered or threatened).

Discreteness

Under the DPS policy, a population segment of a vertebrate taxon may be considered discrete if it satisfies either one of the following conditions:

(1) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.

(2) It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation

status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

Least chub are distributed across three Genetic Management Units (GMU)—West Desert GMU, Sevier GMU, and Wasatch Front GMU. The GMUs were delineated by the LCCT based on genetics information which showed population similarities in these areas (Mock and Miller 2005, pp. 271–277). There are 5 naturally occurring (excluding Mona Springs due to a lack of a self-sustaining population) and 10 successful introduced populations of least chub distributed across these three GMUs. Least chub in these GMUs are markedly separated from each as a consequence of physical (geographic) features, and as a result appear to exhibit genetic divergence as well. We, therefore, conclude that the three GMUs are discrete under the Service's DPS policy.

Significance

If a population segment is considered discrete under one or more of the conditions described in the Service's DPS policy, its biological and ecological significance will be considered in light of Congressional guidance that the authority to list DPSs be used ''sparingly'' while encouraging the conservation of genetic diversity. In making this determination, we consider available scientific evidence of the discrete population segment's importance to the taxon to which it belongs. Since precise circumstances are likely to vary considerably from case to case, the DPS policy does not describe all the classes of information that might be used in determining the biological and ecological importance of a discrete population. However, the DPS policy describes four possible classes of information that provide evidence of a population segment's biological and ecological importance to the taxon to which it belongs. As specified in the DPS policy (61 FR 4722), this consideration of the population segment's significance may include, but is not limited to, the following:

(1) Persistence of the discrete population segment in an ecological setting unusual or unique to the taxon;

(2) Evidence that loss of the discrete population segment would result in a significant gap in the range of a taxon;

(3) Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range; or

(4) Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

A population segment needs to satisfy only one of these conditions to be considered significant. Furthermore, other information may be used as appropriate to provide evidence for significance.

Because of the isolated status of the least chub GMUs, each GMU could be considered potentially discrete based on the physical, geographic factors separating the existing populations. However, separate GMUs and configurations of GMUs would not meet the standard of being significant for several reasons: They do not occur in an unusual ecological setting; their loss would not result in a significant gap in the range of the species; they do not represent the last surviving natural occurrence; and they are not markedly separate from other populations in their genetic characteristics. We conclude that none of the three GMUs were independently significant because they would not meet any of the four standards under our policy definition of significant.

We determine, based on a review of the best available information, that the least chub GMUs are not independently significant in relation to the remainder of the taxon. Therefore, these population segments do not qualify as DPSs under our 1996 DPS policy and are not listable entities under the Act. Since we found that the population segments do not meet the significance element and, therefore, do not qualify as DPSs under the Service's DPS policy, we will not proceed with an evaluation of the status of the population segments under the Act.

Significant Portion of Its Range Analysis

Under the Act and our implementing regulations, a species may warrant listing if it is endangered or threatened throughout all or a significant portion of its range. The Act defines ''endangered species'' as any species which is ''in danger of extinction throughout all or a significant portion of its range,'' and ''threatened species'' as any species which is ''likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' The term ''species'' includes ''any subspecies of fish or wildlife or plants, and any distinct population segment [DPS] of any species of vertebrate fish or wildlife which interbreeds when mature.'' We published a final policy interpreting the phrase ''Significant Portion of its Range'' (SPR) (79 FR 37578, July 1, 2014). The final policy states that (1) if a species is found to be endangered or threatened throughout a significant portion of its range, the entire species is listed as endangered or threatened, respectively, and the Act's protections apply to all individuals of the species wherever found; (2) a portion of the range of a species is ''significant'' if the species is not currently endangered or threatened throughout all of its range, but the portion's contribution to the viability of the species is so important that, without the members in that portion, the species would be in danger of extinction, or likely to become so in the foreseeable future, throughout all of its range; (3) the range of a species is considered to be the general geographical area within which that species can be found at the time the Service or the National Marine Fisheries Service (NMFS) makes any particular status determination; and (4) if a vertebrate species is endangered or threatened throughout an SPR, and the population in that significant portion is a valid DPS, we will list the DPS rather than the entire taxonomic species or subspecies.

The SPR policy is applied to all status determinations, including analyses for the purposes of making listing, delisting, and reclassification determinations. The procedure for analyzing whether any portion is an SPR is similar, regardless of the type of status determination we are making. The first step in our analysis of the status of a species is to determine its status throughout all of its range. If we determine that the species is in danger of extinction, or likely to become so in the foreseeable future, throughout all of its range, we list the species as endangered (or threatened) and no SPR analysis will be required. If the species is neither endangered nor threatened throughout all of its range, we determine whether the species is endangered or threatened throughout a significant portion of its range. If it is, we list the species as endangered or threatened, respectively; if it is not, we conclude that listing the species is not warranted.

When we conduct an SPR analysis, we first identify any portions of the species' range that warrant further consideration. The range of a species can theoretically be divided into portions in an infinite number of ways. However, there is no purpose to analyzing portions of the range that are not reasonably likely to be significant and endangered or threatened. To identify only those portions that warrant further consideration, we determine whether there is substantial information indicating that (1) the portions may be significant and (2) the species may be in danger of extinction in those portions or likely to become so within the foreseeable future. We emphasize that answering these questions in the affirmative is not a determination that the species is endangered or threatened throughout a significant portion of its range—rather, it is a step in determining whether a more detailed analysis of the issue is required. In practice, a key part of this analysis is whether the threats are geographically concentrated in some way. If the threats to the species are affecting it uniformly throughout its range, no portion is likely to warrant further consideration. Moreover, if any concentration of threats apply only to portions of the range that clearly do not meet the biologically based definition of ''significant'' (i.e., the loss of that portion clearly would not be expected to increase the vulnerability to extinction of the entire species), those portions will not warrant further consideration.

If we identify any portions that may be both (1) significant and (2) endangered or threatened, we engage in a more detailed analysis to determine whether these standards are indeed met. As discussed above, to determine whether a portion of the range of a species is significant, we consider whether, under a hypothetical scenario, the portion's contribution to the viability of the species is so important that, without the members in that portion, the species would be in danger of extinction or likely to become so in the foreseeable future throughout all of its range. This analysis will consider the contribution of that portion to the viability of the species based on principles of conservation biology. Contribution would be evaluated using the concepts of redundancy, resiliency, and representation. (These concepts can similarly be expressed in terms of abundance, spatial distribution, productivity, and diversity.) The identification of an SPR does not create a presumption, prejudgment, or other determination as to whether the species in that identified SPR is endangered or threatened. We must go through a separate analysis to determine whether the species is endangered or threatened in the SPR. To determine whether a species is endangered or threatened throughout an SPR, we will use the same standards and methodology that we use to determine if a species is endangered or threatened throughout its range.

Depending on the biology of the species, its range, and the threats it faces, it may be more efficient to address the ''significant'' question first, or the status question first. Thus, if we determine that a portion of the range is not ''significant,'' we do not need to determine whether the species is endangered or threatened there; if we determine that the species is not endangered or threatened in a portion of its range, we do not need to determine if that portion is ''significant.''

We evaluated the current range of the least chub to determine if there is any apparent geographic concentration of potential threats for the species. The range for least chub is limited to the springs and seasonally-connected marsh habitats where they are found. We examined potential threats from livestock grazing, oil and gas leasing and exploration, mining, urban and suburban and development, water withdrawal and diversion, overutilization, disease or predation, the inadequacy of existing regulatory mechanisms, drought, and climate change. We found no concentration of threats that suggests that least chub may be in danger of extinction in a portion of its range. We found no portions of the range where potential threats are significantly concentrated or substantially greater than in other portions of its range. Therefore, we find that factors affecting the species are essentially uniform throughout its range, indicating no portion of the range of the species warrants further consideration of possible endangered or threatened status under the Act.

Our review of the best available scientific and commercial information indicates that the least chub is not in danger of extinction (endangered) nor likely to become endangered within the foreseeable future (threatened), throughout all or a significant portion of its range. Therefore, we find that listing this species as an endangered or threatened species under the Act is not warranted at this time.

We request that you submit any new information concerning the status of, or threats to, the least chub to our Utah Ecological Services Field Office (see **ADDRESSES**) whenever it becomes available. New information will help us monitor this species and encourage its conservation. If an emergency situation develops for this species, we will act to provide immediate protection.

References Cited

A complete list of references cited is available on the Internet at *http://www.regulations.gov* and upon request from the Utah Ecological Services Field Office (see **ADDRESSES** section).

Authors

The primary authors of this notice are the staff members of the Utah Ecological Services Field Office.

Authority

The authority for this action is section 4 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: August 12, 2014.

Stephen Guertin,

Acting Director, U.S. Fish and Wildlife Service.

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